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GRAPHY

UREAU
MOLOGY

OILS AS INSECTICIDES

An annotated bibliography

Prepared

in the

Division of Deciduous Fruit Insect Investigations

Bureau of Entomology

United States Department of Agriculture, Washington, D. C.

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Introductory Explanation

The Division of Deciduous Fruit Insect Investigations has prepared, under the supervision of J. W. Bulger, three copies, arranged alphabetically by author, so as to make available, to persons interested in oils as insecticides, the references and the information contained in the accompanying abstracts.

The abstracts in this bibliography were prepared prior to February, 1927, by Dr. C. H. Richardson and R. C. Burdette, and was considered a fairly complete bibliography to that date. About three or four hundred abstracts, prepared by them but not yet typed, have been omitted. No abstracts have been added to this bibliography since the above date.

The abstracts prepared by Dr. C. H. Richardson and R. C. Burdette have been copied directly from typed filing cards and neither the abstracts nor the references have been completely checked.

A number of papers were considered important enough to require longer abstracts that could be placed upon the 3 x 5 filing cards used in most of this bibliography. These have also been photocopied and are referred to in the author's alphabetical list as "Supplementary Abstracts". They are arranged alphabetically by author and given just after the main bibliography. Any particular abstract may by found by referring to the same number as that given in the main bibliography.

1 [illegible]. A. A.

Com combater os pulgoes das arbores fructiferas. Correio Agricola Vol.2,No.5,p.149.

Tropical fruit are sprayed for aphids with kerosene emulsion diluted 1-9 to 1-15. The emulsion consists of 3 liters kerosene, 500 g. soap & 4 liters water.

2 1917. A.C.B.

The celery fly and parsnips.

Gardeners' Chronicle,London,Vol.LXI,No. 1592, 30th June,1917, p.261.

To prevent egg laying, the foliage must be made distasteful by spraying with paraffin emulsion or other sprays or dusts.

3 1897 Abbey, G.

The pear gall gnat

Jour. Hort & Cottage Gardener, Vol. 46,No.2540 p 486.

When the flies appear, spray the trees, just before the blossoms open, with soluble petroleum again when the blossom is well open and a third time after the petals fall. The soluble petroleum does not affect the setting.

4 1923. Ackerman, A. J.

Preliminary report on control of San Jose scale with lubricating oil emulsion.

U.S.D.A. Dept.Circ. 263, 18 pp.

The San Jose scale can be controlled by using a 2% paraffin oil or lubricating oil emulsion. This emulsion is made by the regular government formula. No indication of injury resulted from its use during the dormant season.

5

Ackerman, A. J, Porter,B.A.,Flint,W.P. and Davis,J.J. 1924. Results of a conference. Recommendations. Purdu Agr. Expt. Sta. Exten. Service News Notes.

See Supplementary abstract

6 1907. Adams, C. F.

Some insects of orchard and other fruits.

Ark.Agr.Expt.Sta.Bul.92,17 pp.

The R & H formula is given.

7 1908. Adams, C. F.

The San Jose scale in Arkansas.

Ark.Agr.Expt.Sta.Bul.102,pp.219-236.

The R & H formula is given.

8 1925. Alden, Charles H.

San Jose Scale Control with lubricating oil emulsion on peach trees in the South.

Jour. Econ. Ent. vol. 18, no. 2, [illegible]3-257

See Supplementary abstract

9 1894- Aldrich, J. M .

Insecticides and Spraying; Idaho Agric. Expt Sta. Bul. 7, 18 pp.

Kerosene emulsion is a mechanical mixture of kerosene and water, so made by the assistance of soap and heat that the kerosene remains permanently diluted. The formula is as follows: Kerosene, 2 gals., water 1 gal. hard soap, (cheap) 1/2 lb. Heat water and dissolve soap in it. Add the kerosene to the boiling solution and churn violently by forcing it thru' the spraying nozzle, back into the receptacle. Before using, dilute with more water so that the kerosene will amount to only about 6% of the whole volume. It is a very useful insecticide for plant lice and will also kill all [illegible] caterpillars that eat foliage. Sheep have been dipped in it for scab, with excellent results. It will kill lice on cattle and horses, when rubbed on them with a sponge or cloth.

10 1898- Aldrich, J. M.

Report of the Department of Entomology. Idaho Agric. Expt. Sta. Bul. 15, pp. 167-76.

Kerosene was put on water in a hopper dozer to kill grasshoppers. It was also used against mosquito wrigglers. Wrigglers in a tomato can were killed with 2 drops of oil. However an experiment on a shallow pond was not successful. The conclusion from this experiment is that kerosene to be effective against mosquito larvae must cover the surface to a perceptible depth; a mere film will not answer.

11 1901-Aldrich, J. M.

I. Crude Petroleum.
II. The Elm Louse.
III. The pear Leaf-blister Mite.

Idaho Agr. Expt. Sta. Bul. 26, pp. 15-24.

See Supplementary abstract

12 1904-Aldrich, J. M.

Winter Spraying for the Apple Aphis. Idaho Agric. Expt. Sta. Bul. 40, pp. 273-288.

In spraying for the eggs of the aphis, pure kerosene, kerosene emulsion 1/3 kerosene, kerosene emulsion 1/5 kerosene, and crude petroleum emulsion were used with other sprays. The spraying was done before the buds began to swell. Crude petroleum could not be uniformly applied. The emulsion was very unstable and the oil was too thick to apply pure. No damage resulted to the trees. But in many cases the eggs of lice were not destroyed. Pure kerosene seriously injured the trees but killed all the eggs. Kerosene emulsion of 1/3 strength injured foliage to some extent: it did not kill the eggs with uniformity. At 1/5 strength it did not injure foliage, [illegible] emulsion was made by dissolving 1/2 lb. hard soap in 1 gal. of boiling water and adding [illegible] gallons of kerosene. It was emulsified in the usual manner.

13 1904 - Aldrich, J. M.

Grasshopper and Cricket Outbreaks. Idaho Agric. Expt. Sta. Bul. 41, pp. 289-304.

Crude petroleum was used in burning over the grass to kill the grasshoppers. The oil was also sprayed upon the insects where practicable. Many hoppers were killed.

14 1922. Allen, A. [illegible]

[illegible]

U.S. [illegible], Vol. XVI, [illegible]

Oil [illegible] must be light enough [illegible] film, yet heavy enough to [illegible] unbroken surface in the [illegible]. Kerosene is the best oil [illegible] inlets and surface water [illegible]

15 1900. Allen, R. C.

Scale killing on evergreen fruit trees.

Pacific Rural Press, Vol.LIX,No.14,p.212-213.

The distillate spray appears to be the best one for scales.

16 1902. Allen, R. C.

The distillate emulsion as a spray [illegible] fruit.

Pacific Rural Press, Vol.LXIII,No. 17, 26 Apr. 1902, p.282.

The 28° distillate spray was very effective on the purple scale of citrus. This spray causes some spotting of the fruit.

17
1903. Allen, R. C.

Fumigation or distillate spray.

Pacific Rural Press, Vol. LXVI, No. 9, 29 August, 1903, p.140.

Distillate spray is more effective and better to use for the scale than fumigation. It also kills all the mites that are on the trees.

18
1897. Allen, W. J.

Fruit growing, drying and curing, with a few simple remedies for the prevention and treatment of some insect pests.

Agric.Gaz.of N.S.W.Vol.8,No.10,pp.711-15.

The R & H formula is given for use against black scale on olive trees, Rose beetle, Rose bug, pear leaf blister, black peach aphis, plant lice, melon louse, woolly aphis and plum scale.

19
1902. Allen, W. J.

Experiments for the destruction of San Jose scale.

Agr. Gaz. N.S. Wales, Vol. 13, No. 6, pp. 644-646

Blue oil and kerosene have been successful in pretty well clearing the trees of the scale.

20
1912. Allen, W. J.

The Peach. Diseases and pests.

Agric.Gaz.of N.S.W.Vol.23,No.4,p.346-357.

Red oil emulsion as a winter wash and contact insecticide for woolly aphis, mussel scale, San Jose scale, and red mites. The following formula is given: Add 2 lbs. of soft soap to 1 gal. soft water and boil until dissolved, after which add 2 gals. of red oil and bring to a boil. This is emulsified by pumping into itself. Dilute 1-30 or made formula to 60 gals.

21
1918. Allen, W. J.

Orchard notes. Spraying.

Agric.Gaz.N.S.W.Vol.29, No. 8, p.606-7.

Red spraying oil, applied when the trees are dormant, protects the peach trees from aphis. Red oil is also very efficient on trees infested with San Jose or mussel scale.

22
1920 - Allen, W. J., & Hogg, S.A.

Cherry growing in New South Wales

Agric. Gaz. N.S.W., Vol. XXXI. No. [illegible], pp [illegible]

Some growers found that dipping a wooden plug in kerosene and then driving it into the hole kills the cherry tree borer.

23
1920. Allen, W.J. & Hogg, S.A.

Orchard Notes.

Agric.Gaz.of N.S.W.Vol.31,No.8,p.599-600.

Miscible spraying oils have been used for combatting San Jose scale with some success, but under some conditions they have completely failed. Unless the sap is flowing before the oil is applied, the oil has a tendency to cauterize the bark. If miscible oils are used for the purpose of destroying scale on citrus trees, they should not be applied in very cold weather.

24
1887 - Alwood, W. B.

Tests with insecticides upon garden insects.

USDA Div. of Ent. Bul. 13; pp. 38-47.

Kerosene emulsion diluted 1-5 or 1-3 was effective on cabbage against the cabbage worm. Some injury resulted from its use. A dilution of 1-16 destroyed the cabbage plant louse. A solution of 1-4 was not effective against the white grub.

25
1888. Alwood, W. B.

Kerosene emulsion as a remedy for white grubs.

Insect Life, Vol.1, No.2, p.48-50.

Kerosene emulsion diluted 15 times was used on a lawn for white grubs. No live grubs could be found in the treated plots.

26
18[illegible]. Alwood, W. B.

Report on experiments with remedies against the hop louse.

Report of the Entomologist. Ann.Rept.U.S. D.A. for 1888, pp.102-111.

Kerosene emulsion made by the R & H formula was quite effective against the hop louse when diluted 1-20 to 25.

27
1891. Alwood, W. B.

A note on remedies for the horn fly.

Insect Life, Vol. IV, No. 1 & 2, P.68-9.

The R & H emulsion formula diluted 1-15 was effective for the horn flies.

28
1893 - Alwood, W.B.

Insects & Insecticides.

Va. Agr. Expt. Sta. Bul. 24, pp. 1-23.

The R & H formula for kerosene emulsion is given.

29
1897 - Alwood, W.B.

Notes on the treatment of San Jose scale, with directions for winter work.

Va. Agr. Expt Sta. Bul. 72; 11 pp.

Pure kerosene is recommended as a winter wash for old trees. The kerosene should not be a grade lower than 120° flash test. Low grades are more dangerous to plants than high grades. It should be used only on a bright warm day when the plants are dry.

30
1898? Alwood, W.B.

U.S. Dept. Agr. Bur. Ent. Bul. 40, p. 38

Kerosene against scale on Winesap apple trees.

31
1898? Alwood, W.B.

U.S. Dept. Agr. Div. Ent. Bul. 17, n.s. p.50

Kerosene against San Jose Scale on fruit trees.

32
1898. Alwood, W. B.

The results of two years' work on the San Jose scale.

Trans. New York State Agr. Soc., 1897, pp. 549-569.

Pure kerosene was used on pear trees without injury and apparently the scale was destroyed. The spray was applied at the time the buds were swollen.

33
1898. Alwood, W. B.

Summer treatment for the San Jose Scale.

Virginia Agr. Expt. Sta. Bul. 74, pp. 28-34.

Kerosene may be used safely upon all the fruit trees in the dormant season and with proper precautions during the growing season also.

34
1899 - Alwood, W. B.

2nd Rept. of the Va. State Insepctor for the San Jose scale. 34 pp.

Pure kerosene and a 30% kerosene and water mixture were used on young trees without injury. No live scale could be found on the trees.

35
1899 - Alwood, W.B.

Inspection and remedial treatment of San Jose scale.

Va. Agr. Expt. Sta. Bul. 79, pp. 73-94.

Altwood, W.B.
See Bul. 74 of this station for use and application of kerosene.

36
1903 - Alwood, W. B.
Orchard studies; IV, Remedial Measures against San Jose Scale.
Va. Agr. Expt.Sta.Bul. 131; pp;149-169.

Pure kerosene is not recommended except in case of necessity. Kerosene and water mixture is recommended but with care in making the application. This may be used on peach. Crude petroleum can only be used on dormant trees. An oil of 43-45° Be should be used. The R & H formula for kerosene emulsion is given. The same formula is used for making a petroleum soap emulsion.

37
1903. Alwood, W. B.

Pure kerosene for the scale.

Rural New Yorker, Vol.LXII, No.2802, p.707.

Kerosene emulsion made by the regular formula diluted twice with water was quite safe on peaches and fairly effective in destroying the scale. Crude oil may be used in the place of kerosene.

38
1903. Alwood, W. B.

Spraying trees with kerosene.

Rural New Yorker, Vol.LXII, No.2808, p.802.

It is not advisable to spray trees with kerosene in the Autumn. Kerosene is better just before the buds push out.

39
1888. Anderson, F. E.

Kerosene emulsion against the cabbage worms.

Insect Life, Vol.1, No.2, p.27-8.

Kerosene emulsion was used successfully against cabbage worms. Only slight injury resulted from its use.

40
1915. Anderson, T. J.

Report on the entomological laboratory for the year ending 31st March, 1914.

Ann.Rept.Dept.Agric.British East Africa, 1913-1914, pp. 52-83.

Kerosene emulsion 10% may be used during dull weather in June and July; a 5% emulsion in bright weather for scale insects on coffee.

41
1917. Anderson, T. J.

Notes on insects injurious to coffee.

Dept.Agric.British East Africa, Nairobi, Agric.Bull., pp.20-43.

The R & H formula is given for use on scales of coffee.

42
1919. Andrews, E. A.

Insect pests of tea.

Qtrly.Jl.Scient.Dept.Indian Tea Assoc., Calcutta, 1919, Part 1, pp.22-25.

The tea aphis may be treated with an oil emulsion sprayed from below.

43
1918. Andrews, E. A.

An experiment on the treatment of red spider by insecticides.
Qtrly. Jl. Scient.Dept.Indian Tea Assoc., Calcutta, Pt. 2, pp.46-49.
Crude oil emulsion proved to be not so useful a treatment for red spider.

44
1922. Andrews, E. A.

A note on crickets.

Qtrly. Jl. Indian Tea Assoc., 1922, No.3, pp.112-114.

The burrows of the crickets may be filled with kerosene emulsion 1-20 to kill any adults that may not have laid eggs.

45
1915. Andrews, E. A.

Entomologists' Tour in the Darjuling and Terai districts.
Qtrly.Jl.Scient.Dept.Ind.Tea Assoc., Calcutta, Part III, 1915, PP75-78.
A species of Empoassa attacking the Fullidha trees may be controlled by spraying with kerosene emulsion.

46
1895. Anon.

My mother's garden.

So.Cultivator, Vol.53, No.5, May, 1895, pp.232-4.

The R & H formula for kerosene emulsion is given.

47
1897. Anon.

Larch.

Garden Chron. 3 ser., Vol.22, No.549, July 3, 1897, p.12.
For pine weevil destroying larch, the application of quicklime or diluted paraffin on the ground beneath the trees or as a wash to the trunks is recommended.

48
1897. Anon.

The Woolly Aphis or American Blight.

Jour.Hort, Vol.34 (3rd ser.), pp.347-348.

The Autumn and winter treatment for the woolly aphis is paraffin emulsion. 3 gals. of paraffin to 1 gal. of soft soap and 25 gals. of water. The paraffin is added to the hot soapy water and the whole made into a creamy mass.

49
Anon.
1919
Chemical Trade Journal. Petroleum by-products. Vol. 64, May 3, 1919, p. 389. Review of paper by Alfred Renouard in Les Matières Grasses, April 15, 1919, describing the nature and some of the technical uses of the naphthenic acids obtained from crude naphtha by treating with alkali and mineral acid.

50
1921. Anon.

Top minnows as yellow fever eradicators.

Science, Vol.L III, No.1375, pp.432-433.

Minnows are preferred to oiling, as the natives of Mexico used the water for drinking.

51
1922. Anon.

Basket worm.

Planters' Chronicle, Vol. XVII, No.41, p.581.

To keep the basket worm from the tapped surfact of rubber trees, a 2% mixture of kerosene, Arboretas Agrisol, Brunolinum, etc., must be applied once each week.

52
1923. Anon.

The periodical cicadas.

Science, Vol.LVII, No.1482, Suppmt., pp.xii-xiv.

Orchards and shrubs may be partly protected by spraying with kerosene emulsion at the time the insects are emerging from their shells.

53
1918. Anon.(Calif.)

A power sprayer for mosquito eradication.

Calif.State Board of Health, Monthly Bull.Vol.14, No.1. pp.20-21.
This apparatus consists of an air compressor mounted upon a motor truck operated by the engine of same, enabling oil to be sprayed under compressed air.

54
1902. Anon. (Colorado)

Remedies and formulas adopted by the State Board of Horticulture for extermination of pests injurious to tree and plant life.

Colo. State Bd. Hort. Rpt. 1901, pp. 273-292.

Kerosene emulsion was useful in destroying sucking insects. This emulsion was made by dissolving 1 lb. of whale oil or hard soap in 1 gal. of boiling water. If the water is hard lye may be used for breaking it. The solution is then heated to boiling and the 2 gals. of kerosene are added and agitated by pumping for five minutes. When diluted with 27 gals. of water the emulsion is ready to use.

55
Anon. (Connecticut)
1895.

The elm leaf beetle. Conn. State Agr. Expt. Sta. Bull. 121, pp. 1-6.

Kerosene emulsion is used for destroying the insects in the pupal condition or beneath the trees. Dissolve 1/2 lb. of common hard soap in 1 gal. of boiling water; to this soap solution while still warm, add 2 gallons of kerosene and churn violently for five minutes. Dilute this by stirring with 10 times its bulk of cold water. The soil should be saturated where the pupae exist. This application is not injurious to grass. While the touch of a very little kerosene to the bodies of larvae and fairly young pupa is fatal, the emulsion may fail to destroy hairy worms or older pupae, because the hairs of the former ar the "chitinous" membranes of the latter shield the soft and vulnerable parts from actual contact with it.

56
Anon. (Connecticut)
1917. Miscellaneous insect notes.
Conn. Agr. Expt. Sta. State Entomologists 16th Rpt. (for year 1916, p. 142.

For the sucking dog louse, kerosene and water and a thorough combing kept them down for a week or so, when they reappeared again. Paraffin oil about 28° gravity, was used, the hair and skin was saturated thoroughly, and then washed off with soap and water an hour or so later. Two such treatments a month apart completely routed the pest.

57
Anon (Delaware)

Spray Calendar. Delaware Agr. Expt. Sta. Special Bul. B., p. I.

Kerosene emulsion formula: Kerosene 2 gals., common soap 1/2 lb., water 1 gal. Dissolve soap in boiling water, while still boiling add the kerosene oil, emulsifying the mixture by pumping thru a force pump equipped with a spray nozzle. Dilute with 9 to 15 parts of water so that the spray will not contain more than one part oil to fifteen of water.

58
1924 - Anon (Indiana)

United effort to be used in San Jose scale control. Extension Service News Notes. Agricultural items of interest in Indiana. Purdue Agr. Exp. Sta. 2 p.

59
1900. Anon. (Jamaica)

Scale on fruit trees.

Jour. Jamaica Agr. Soc., Vol. 4, No. 12, pp. 719-720.

To destroy the scale, 2 lbs. of soft soap and 1 qt. of kerosene oil are mixed with the fingers until they form a cream-like substance; This is thoroly dissolved in 5 gals. of tepid water and then passed thru a spray pump four or five times. This mixture must be sprayed on the insects as it only kills by covering them and causing suffocation.

60
1902. Anon. (Jamaica)

Thrips on cocoa.

Bul. Bot. Dept. Jamaica, Vol. 9, No. 5, pp. 70, 71.

If thrips increase much, the pods should be sprayed, before they are ripe, with kerosene emulsion.

61
1894. Anon. (Kew.)

Preservation of books in the tropics.

Bull. of Misc. Information. Royal Gardens, Kew. Bul 90, pp. 217-18.

The sponging of the books with a little of the finest kerosene oil will render them to a great extent distasteful to the insects.

62
1897 Anon (London)

The woolly aphis or American blight

Jour. Hort & Cottage Gardener, London, Vol. 46

No. 2534, p 347-8

The infested trees should be treated in the autumn with a mixture of soft soap and kerosene in the proportions of 3 gals. kerosene to 1 lb soft soap and 25 gals of water

63
1897 Anon (London)

The celery fly

Jour. Hort. & Cottage Gardener, London, Vol. 46 No. 2532, Bd Agr. Leaflet 35, Apr. 8, 1897, P. 298

Spraying the plants with a mixture of kerosene and soft soap and water at the rate of 1 qt of kerosene and 1/2 lb soft soap to 10 gals water has been very effective.

64
1897. Anon. (London)

Injurious insects and fungi.

Jour. Bd. Agr. London, Vol. 3, No. 4, pp. 390-392.

Kerosene emulsion made by mixing kerosene and soft soap together in the proportions of 1 gal. kerosene and 1/4 lb. soft soap to 10 gals. of water is recommended for the carrot fly.

65
1899. Anon. (London)

The pear and cherry sawfly.

Jour Bd. Agr. (London) Vol. 6, No. 3, pp. 341-345.

The R & H formula for kerosene emulsion is given. This is diluted with 10 gals. of water before spraying.

66
Anon. (London)
1901. Currant aphids.

Jour. Bd. Agr. (London) Vol. 8, No. 3, pp. 306-312.

Early spraying with paraffin emulsion is the best treatment for the currant aphid. This emulsion is made by mixing equal parts of boiling soft soap solution and paraffin together and pumping until a creamy emulsion is produced.

67
1919 - Anon. (London)

The celery fly

Ministry of Agric. and Fisheries London, Leaflet 35, 3 pp.

Paraffin (kerosene) emulsion was recommended as a deterrent.

68
1920 - Anon (London)

The small ermine moths

Ministry of Agri. and Fisheries, London, Leaflet No. 65, 4 pp.

Paraffin emulsions and miscible oils are recommended. The following formula for making paraffine emulsion is given. Paraffin 1 gal: soft soap 1-1/2 -2 lbs; water 10 gals; this is made in the usual way.

69
1921. Anon. (London)

Chermes attacking spruce and other conifers.

Forestry Comm., London, Leaflet 7, 7 pp.

Paraffin emulsion is recommended for use in nurseries, in parks and pleasure grounds. It is made by the following formula: Paraffin 2 pts., soft soap 1 lb., soft water 10 gals.

70
1921 - Anon (London)

Currant and goosberry aphides

Ministry of Agriculture and Fisheries, London, Leaflet 5? 2 pp.

Early spraying with a ... contact spray such as paraffin emulsion, before leaves become curled or shoots distorted, is effective.

71
1924 - Anon. (New Mexico)

Work with economic insects at the N. Mexico Station.

35th Ann. Rept. New Mexico Agr. Expt. Sta. pp. 19 -20.

Experiments conducted show the use of oil sprays to be more efficient in the control of the San Jose scale than is lime sulfur. Ordinary waste engine oil emulsified with casol gave the best results of all the emulsions tried.

72
1916 Anon (New South Wales)

Control of peach aphis

Agri. Gaz, N.S.W., Vol. XXVII, No. 11, p 778

Dormant trees sprayed with red oil showed no attack from aphis the following spring.

73
1923. Anon. (New South Wales)

Investigations in Queensland concerning sheep blow fly.

Agric. Gaz. of N.S.W. Vol. 34, No. 1, p. 14.

It was found that ordinary crude fuel oil was a very good dressing for rams' horns, preventing fly attack for a considerable time.

74
1894 - Anon: (New York)

Insects affective date cabbage, Notes on the Stalk borer, and Insecticides.

N.Y. Agric. Expt. Sta. Bul. 83, pp. 657-688.

Kerosene emulsion is made by dissolving ½ lb. soap in 1 gal. water by boiling. While still hot add 2 gals. of kerosene and emulsify by churning with a force pump until the mixture is is creamy. When rain water cannot be used add a little lye or more soap to break the water. 1 gal. of milk may be used in the place of the soap solution to make a milk kerosene emulsion. If sweet milk is used add a little vinegar. These stock solutions should be diluted with 10 to 20 parts water when used.

75
1894 - Anon. (New York)

I. Some insects injurious to squash, melon, and cucumber vines.
II. The asparagus beetle.

N. Y. Agric. Expt. Sta. Bul. 75, n.s. pp. 409 - 427.

Kerosene emulsion will kill the old squash bugs if applied at 1-4 strength but endangers the plant. It can be fan used with safety at 1-9 and will kill the young bugs. Diluted 1-12 to 15 it will kill the melon louse.

76
1895 - Anon (New York)

The San Jose or Pernicious Scale.

N.Y. Agric. Expt. Sta. Bul. 87, n.s. pp. 122-132

Kerosene emulsion made by the following formula is recommended for a winter wash. Dissolve 1/2 lb. of whale oil or common soap in 1 gal. of boiling soft water. While still hot add 2 gals. kerosene and churn with a force pump for 10 minutes. Dilute 1 part emulsion to 3 to 5 parts water when ready to use.

77
1901. Anon. (New York)

Cabbage worms and lice.

Rural New Yorker, June 29, 1901, Vol. LX, No. 2683, P. 451.

Kerosene emulsion is re... for ... lice.

78
1912. Anon. (New York)

Oil sprays.
Rural New Yorker, Vol. LXXI, No. 4135, p. 96.

Oils both clear and emulsified have been among the most effective remedies in controlling certain classes of insects as San Jose scale. And when properly applied and made, very little injury resulted from their use. Pure crude oil was very effective against the San Jose scale, but it caused considerable injury.

79
1925. Anon. (New Zeland)

Principal spraying compounds.

Jour. Dept. Agric. New Zealand, Vol. XI, No. 5, p. 433-5.

Miscible oils are contact insecticides for scales, aphids and mites. Red-oil emulsion is made by the R & H formula and diluted 1-12. The R & H kerosene formula is given.

80
1915. Anon. (New Zeland)

Tests of spraying compounds.

Jour. Dept. Agric. N. Zealand, Vol. X, No. 1, p. 35-4..

Gargoyle red spraying oil was effective for scale and all woolly aphis it touched.

81
1... Anon. (New Zeland)

Orchard pests and diseases.

Jour. Dept. Agr. N. Z. Vol. 13, No. 3, pp. 182-185.

The R & H formula is used for making red oil emulsion and kerosene emulsion.

82
Anon (New Zeland)

83
1922 - Anon (North Dakota)

Dipping Vats.

N. Dakota Agr. Coll. Ext. Div. Circ. 47.

Crude oil emulsion formula: Rosin in small pieces, 4 lbs; lye in cans 1.5 lbs., crude oil 40 gals; water to make 100 gals. This is a 40% oil emulsion and recommended for mange or scab in horses and cattle. Directions are given for preparing the emulsion. Soft water is preferred. A formula for spraying buildings to destroy lice, mites and ticks follows: Crude oil 3 gals., kerosene 1 gal., These are mixed thoroly and the buildings sprayed in the ...

84
1902. Anon. (Ontario)

The San Jose scale in Ohio and in Ontario.

32nd Ann. Rept. Ontario Ent. Soc. 1901, pp. 7-12.

Crude petroleum is an effective remedy, but great care must be exercised in using it.

85
1907. Anon. (Ontario)

Remedies for the San José scale. San José scale Act.

Ontario Dept. Agr. Bul. 157, 12 pp.

Crude oil has been used only on apple and pear trees due to the fact that they are most resistant. It is essential that the oil be applied as light as possible and an oil of as high specific gravity as can be obtained.

Kerosene emulsion made by the R & H formula may be used as a summer spray for the scale when diluted 1-6 or 8. Crude oil emulsion made by the same formula may also be used when diluted 1-10.

86 Anon. Oregon

[Report of the Oregon Station] department of entomology (*Oregon Sta. Bien Rpt. 1921-22. pp. 75-79, 88*).—In reporting upon a study of the physical improvement of the spray solution and its effect on the toxicity of the insecticide, calcium caseinate for use as a spreader and oil emulsions are briefly dealt with.

Tests with commercially prepared calcium caseinate and similar material prepared in the laboratory indicate that "(1) the addition of the caseinate spreader in combination sprays of lead arsenate lime sulphur materially delays the reaction between the two materials with the attendant formation of the undesirable sludge. (2) Caseinate spreaders in the late cover sprays on apple, by effecting a smooth, even covering of the spray over the fruit surface, minimize the uneven coloring of the highly colored varieties of fruit, so undesirable and almost sure to occur where a blotchy spray covering is given. (3) In general, by effecting a more rapid covering and wetting of the sprayed surface, the addition of caseinate spreaders tends to increase the number of trees covered per tank of spray. (4) In toxicity tests carried out with caterpillars, no evidence was found to substantiate the theory that the addition of caseinate spreader adversely affects the toxicity of the arsenate spray." A number of emulsions were prepared from various animal and vegetable oils, saponin solution giving the best results as an emulsifier.

The results of work with important pests during the year are briefly referred to. Codling moth studies resulted in the issuance of recommendations for the timing of the applications, with an estimated saving of at least 8 per cent of the crop of the Hood River Substation district. In investigations of sprays for the eggs of leafrollers, sprays consisting of combinations of oil emulsions, 5 per cent oil, with lime and glue, gave best results.

87
1916. Anon. (Peradeniya)

The rice case-worm.

Tropical Agriculturist, Peradeniya, Vol. XLVI, No. 3, pp. 158-159.

Kerosene can be floated on the water to kill the case worm.

88
1907. Anon. (Sao Paulo)

Destruccas dos carrapatos.
Boletim da Agricultura. Sao Paulo (Ser. 8), No. 8, pp. 380-384.
Ticks on cattle and sheep are killed by spraying with the following mixture: Kerosene 4 liters, cottonseed oil 4 liters, flowers of sulphur 500 gms., liquid tar 1 liter. The treatment should be repeated every 10 days. Crude oil (Texas crude) is also recommended as a spray for tick-infested animals. A 15-25% mixture of kerosene and water will kill within 24 hours all ticks that are wetted. Paraffin oil is also recommended for the ticks.

89
1912 Anon (South Africa, Union of)

Pernicious scale notes

Agric. Jour. Union S. Africa, Vol. IV, No. 1, P 126-131.

Kerosene, pure and with water was very effective against the pernicious and other scales but the risk of injuring trees detracts from its use. Red oil emulsion has been used with success in Australia. Miscible oils are very effective against the scales. A dilution not greater than 1-15 should be used. This spray should be applied only in the dormant season.

90
1921. Anon. (South Africa, Union of)

Departmental Activities: Entomology.

Jl. Dept. Agric., Union S. Africa, Vol. II, No. 4, pp. 301-306.

The following formula is recommended as a cheap and effective dressing for lambs' tails; 15 lbs. of fat, beef or mutton, 1-1/2 pts. of kerosene, Mixed [illegible].

91
1923 Anon (South Africa, Union of)

Woolly aphis in apple trees.

Jour. Dept. Agr. U. of S. Africa, Vol. VI, No. 3, P 273

As a winter spray miscible oil, such as Harbas or Scalecide may be used.

92
1923 Anon (South Africa, Union of)

Pernicious scale
Jour. Dept. Agric, Union, S. Africa, Vol. 7, No. 3, P. 193-4
Proprietary miscible oils, as Harbas and Scalecide are excellent remedies when used diluted 1-20

93
1924. Anon. (South Africa, Union of)

Departmental activities, Entomology.

Jl. Dept. Agric. Union S. Africa, Vol. IX, No. 2, pp. 98-100.

Miscible oils may be used for the soft scale.

94
1921 Anon (South Audtralia)

The poultry tick

Jl. Dept. Agr. S. Australia, Vol. XXIV, No. 9, [illegible]

[illegible]

95
1917. Anon. (St Kitts-Nevis)

Work connected with insect and fungus pests and their control.
Rpt. Agric. Dept. St. Kitts-Nevis for 1916-1917, p. 12 and p. 36.
A species of Lachnopus was collected in water with a film of kerosene on it.

96
1916. Anon. (Texas)

[illegible] of its introduction at El Paso, Texas.

U.S.P.H. Repts. Vol. XXXII, No. 5, 2nd Feb. 1917, [illegible].

Travelers must be freed of vermin by an application of [illegible] or a mixture of vinegar and kerosene.

97
1892 - Anon (U.S.D.A.)

Spraying for insect pests and fungous diseases

U. S. D. A. Farmer's Bul. 7, 20 pp

The R & H kerosene emulsion formula is given.

98
1906? Anon. (U.S. D.A.)

U.S. Dept. Agr. Farmers Bul. 267, p. 28

Kerosene emulsion against Horn flies infesting cattle.

99
1906? Anon. (U.S.D.A.).

U.S. Dept. Agr. Farmers Bul. 296, p. 19

Kerosene emulsion against Cottony maple scale infesting maples.

100
1908. Anon. (U.S. D. A.)

Preparation of miscible oils.

U.S.D.A. Farmers' Bul. 329, pp. 26-28.

This article is compiled from Delaware Sta. Bul. 75 and Circ. 1; New Jersey Sta. Rept. 1904, P. 644; 1905, P. 615; 1906, P. 587; Pennsylvania Sta. Bul. 86; U.S.D.A. Farmers' Bul. 127.

101
1916. Anon. (Washington State)

Experimental sprays.

Ann. Rept. Yakima County Hort. Dept. f. 1916, N. Yakima, Wash, p. 37.

Distillate oil emulsion used at the rate of 1-1/2 to 2 gals. per 100 gals. of water gave very good results on the San Jose scale in summer.

102
1919. Anon. (Washington State)

Grasshoppers in Okanogan County.

Washington State Dept.Agric.Mthly.News Letter, Vol. I, No. 4, P. 1.

Hatching beds were covered with swarms of little black hoppers, which were dosed with kerosene, which often killed 200 to the square foot.

103
1927 Arndt, Willey

Hydrohexalin(in the manfg. of soaps and water-soluble oils)

Kunstoffe 17, 4-5

104
1920. Artega, Julio F.

Plan de una campaña sanitaria contra el paludismo en la Republica de Cuba.

Revista de Medicina y Cirugia de la Habana. Vol.25, No.12, pp.299-329.

Mentions the use of kerosene as a mosquito larvicide.

105
1892. Ashton, T. B.

How to kill tree borers.

Insect Life, Vol.IV, Nos.7 & 8, p.270-1.

Undiluted kerosene applied to the places where castings of the borers are seen, proved an effective remedy.

106
1890. Atkinson, G.F.

Kerosene Emulsion; how to make and apply it. Bull. 15, Ala. Agr. Expt. Sta. Apr. 6 p.

Boil one half pound of common bar soap in 1 gal. water. While hot add 2 gals. Kerosene oil. Pump thru a nozzle until emulsified. Dilute 1-9 for use on aphids.

107
1922. Austin, G. D.

A preliminary report on paddy fly investigations.

Ceylon Dept.Agric., Bull.59, 22 pp.

Ropes saturated with kerosene and dragged across affected fields did not give good results.

108
1923. Auton, W.

Woolly apnis.

Gardeners' Cnron., Vol.LXXiV, no. 1930, p.369.

The R & H kerosene emulsion formula is given.

109
1923. Ayers, E. L.

Field work for the year, in Florida on insect control.

Qtrly.Bull.State Plant Bd.Florida, Vol.VIII, No.1, pp. 8-17.

The ordinary method of treating scales with oil emulsion spray has not proven very effective.

110
1923. de Azevedo Marques, A.

Parasites da Videira (Pests of the Grape Vine).

Chacaras e quintaes, vol. XXVIII, No.6, pp. 529-530, S. Paulo, 15th Dec., 1923.

Kerosene emulsion (2%) recommended.

111
1921 - Babcock, O.G. & Bennett, D.H.
The screw worm and wool maggott.

Texas Agr.Expt.Sta. Circ. 27, 15 pp.

Flies may be repelled by using one of the following formulae: 1-Pine tar 1 qt., machine oil 1 qt. and cloroform USP. 1 lb, gum camphor 4 oz. The chloroform (1 part) is mixed with 4 parts of the oil mixture. (2) Pine tar 4 oz., castor oil 6 oz., Kerosene 10 oz., turpentine 1 oz. The mixture is placed upon wounds on sheep.

112
1910. Back, E. A.

Sprays for white fly.

Florida Fruit & Produce News, Vol.2, No.29, Apr.15, 1910.

Schnarr's insecticide and Target brand oil sprays were effective in controlling the white fly.

113
1917. Back, E.A. and Crossmann, S.S.

Miscible Oil vs. Fish Oil Soap Sprays for the Control of Florida Aleyrodids.

Jour. Econ. Ent. vol.10, No. 5, pp. 453-458

See Supplementary abstract

114
1916. Bacot, A.

The improvement of fly-spraying fluids and the control of experimental trials.
British Med.Jl., London, Vol.II, No.2919, p.801.
Kerosene emulsion 1-10 killed flies within a period of 12 to 18 hrs. A combination of quick action spray with the oil emulsion proved very satisfactory.

115
1914. Bacot, A. W.

The effect of the vapours of various insecticides upon fleas (Ceratophyllus fasciatus and Xenopsyllis cheopsis) at each stage in their life history and upon the bedbug (Cimex lectularius) in its larval stage.
Jl.Hygiene, Cambridge, Plague, Supplement III, pp.665-681.
The vapor of kerosene is without effect upon C.fasciatus in all stages but has a marked effect on X. cheopis and kills nearly half the individuals of all stages exposed to it. Soap petroleum emulsion may be used in hot countries to advantage for spraying the dwellings that are plague infested.

116
Baerg, W. J.
1921. Spraying for San Jose Scale.
Arkansas Agr. Expt. Sta. Bul. 177, 19 p.

Scalecide used at 1-15 dilution was second in effectiveness to lime sulfur (L.S.). The use of scalecide involves more care to make a thorough application and requires at least as much material as L. S. No tree stimulation was noticed and no injury.

117
1900 - Bailey, L.H? Gould, ..., Fletcher, ...
and Cavanaugh, ...
Spraying Notes.

N.Y. Cornell Univ. Agr.Expt.Sta.Bul. 177-pp. 235-253
The San Jose scale can be controlled by spraying with a 20% kerosene & water mixture when the plant is thoroughly sprayed. Early spring or late fall is preferable. Kerosene should be applied only on sunshiny days, if plants are in foliage.

118
1917. Baker, A. W.

Preliminary notes on the use of repellents for horn flies and stable flies on cattle.

47th Ann.Rept.Entom.Soc.Ontario for 1916, pp.53-56.

Kerosene emulsion made by the R & H formula, diluted at various strengths gave no repellent action.

119
1918. Baker, A. W.

The effect of stable and horn fly attacks on milk production.
48th Ann.Rept.Entom.Soc.Ontario, for 1917, pp. 91-93.
The repellent used in the experiment was a homemade spray mixture made by the following formula: Kerosene, 1 gal.; slightly sour milk, 1 gal.; fish oil, 1 gal.; strong hot soap solution (about 1/2 cake laundry soap), 1 gal.; oil of citronella, 6 oz.; This was applied with a small hand sprayer.

120
1897. Baker, C. F.

I. The San Jose scale. II. Some other insect pests.

Ala.Agr.Expt.Sta.Bul.77,pp.27-34.

Kerosene emulsion was used for cabbage worms and cabbage lice.

121
1905 - Baker, E. L.

Determination of kerosene in kerosene -- lime mixture.

N. Y. Agr. Exp. Sta. (Geneva) Bul 273, pp. 494-496 (1 plate).

A portion of the emulsion is weighed into a flask from which the kerosene is distilled off with steam. The distillate is caught in a burette from which the lower aq. layer is drawn off from time to time. After all the kerosene has passed over, its vol. may be read off in cc. This value multiplied by the sp. gr. of the kerosene gives the wt of kerosene in the sample from which the % in the mixture can be calculated. The distribution of kerosene in the top and lower layers of the mixture was determined.

122
1924 Baker, R.T.

Methods of manufacturing lubricants. Oil and Gas J. 23, No. 13A, 108, 143

Summary of present methods.

123
1913 - Balfour, Dr. A

A year's anti-malarial [illegible] at K[illegible]

Jl. Trop. Med. & Hyg. Vol. VI, No. 15, 228-232

Petroleum or kerosene in [illegible] its limitations in [illegible] exposed to [illegible] wind it gets blown aside, leaving an untreated [illegible] readily by their [illegible].

124
1909 - Ball, E.D.

The leafhopper of the sugar beet and their relation to the "curly leaf" condition.

USDA Bur. Ent. Bul. 66, pt. 4; pp. 33-52.

A thoro spraying with kerosene emulsion (1-5) will destroy most of the Insects that it hits.

125
1917 - Ball, E.D.

The beet leafhopper and the curly-leaf disease that it transmits.

Utah Agr. Col. Expt. Sta. Bul. 155, 56 pp.

A 15% kerosene emulsion must be used to kill the adult beet leafhopper.

126
1918 - Ball, E.D.

The potato leafhopper and the hopperburn that it causes.

2nd Bienn. Rept. Wisc. Dept. Agric. 1917-18, Bul. 20, pp. 76-102.

Kerosene emulsion was found satisfactory for controlling the potato leaf hopper when used at 7 or 8% or 1-8.

127
1919. Ball, E.D.

The potato leaf hopper and its relation to hopperburn.

Jour. Econ. Ent. vol. 12, no. 2, pp. 149-155.

A "rather strong" kerosene emulsion is effective for both nymphs and adults.

128
1913. Ballard, E.

Cotton aphis.

Dept.Agr.Nyasaland Protectorate, Circ.1, of 1913, 1 p.

The R & H kerosene emulsion formula is given. Dilute 1-6 to 10 before using. The aphis must be hit to be killed.

129
1906. Ballou, H. A.

Thrips on cocoa.

Bul. Dept. Agr. Jamaica, Vol. 6, No. 1, pp. 8-11.

The R & H formula is given.

130
1907, Banks, N.

Mites and lice on poultry.

U.S.D.A.Bur.Ent.Circ.92, 8 pp.

The best remedy against the chicken mite is to spray with kerosene emulsion. The R & H formula is used, diluted 1-10.

131
1916. Barber, E. R.

The Argentine Ant: Distribution and control in the United States.

U.S.D.A. Bul.377,23 pp.

Kerosene placed in saucers in which the legs of furniture rest will repel the ant.

132
Baskerville, Charles. Skin diseases from certain lubricants. Jour. Ind. and Eng. Chem., vol. 11, Aug., 1919, pp. 797-798. Note on causes and remedies of oil rashes.

133
1[illegible]. Bateman, E.

Note on the toxicity of mixtures of creosote [illegible] oils.

Proc. Ann. Meeting Amer. Wood-Preservers' Assn. for 1924, Appendix C, pp. 135-140.

[illegible] petroleum and creosote are less toxic than creosote. This was tested on Fomes [illegible].

134
1925. Bateman, Ernest & Henningsen, C.

The toxicity of petroleums (as wood preservatives).

Proc. 21st Ann. Meeting Amer. Wood-Preservers' Assn. Chicago, Feb. 3, 4 & 5, 1925, pp. 57-61.

Conclusions: No petroleums so far examined can [illegible] Petroleum oils may be used as carriers for one or [illegible].

135
1903 - Beach, S.A., Clark, V.A., & Taylor, O.M.

Spray Mixtures and Spray Machinery.
N.Y. State Agr.Expt.Sta. Bul. 243; p. 317-73.

Kerosene emulsion is made by heating ½ lb. whale oil soap and 1 gal pf water together. When boiling hot, remove from the fire and add 2 gals. of kerosene. This mixture is emulsified by pumping into itself for 5 minutes. For summer use, on plant lice and soft bodied insects, the stock should be diluted with 15 to 20 parts of water, for plant bugs, larvae and beetles use 1-7 to 9 parts of water. For winter use dilute 1-4. Crude petroleum and kerosene may be applied pure or emulsified at the rate of 40% oil and 60% water. This may be applied to apple, pear, and plum trees, but not to peach trees.

136
Decker, G. C.
1918. The dormant spray for San Jose Scale.
Arkansas Univ. Agr. Expt. Sta. Bul. 141, 10 p.

Emulsion: Cheap kerosene or crude oil 20 gals.; water 10 gals.; a cheap soap or home made soap 5 lbs.; Made in the usual manner above amounts should be diluted to 100 gals. with water. Use within a week.

137
1922. Becker, George G.

Report of Meeting of Cotton States Entomologists, Dallas, Texas, Nov. 30- Dec. 2, 1921.

Jour. Econ. Ent., vol. 15, no. 1, pp. 10[illegible].

See Supplementary abstract.

137 [illegible], [illegible]
1[illegible]. [illegible] of the Entomologist.
Delaware [illegible]. Agr. Expt. Sta. [illegible] pp.110-129.

Experiments to destroy the black peach aphis. pp.118-9

Kerosene emulsion was used 1-15 and gave promise of proving effectual if persisted in. Another spraying was made which was not effective. When the emulsion was used 1-10, the trees were completely ridded of the aphis pp 119-120

Kerosene emulsion 1-9 was used with apparent success on rose bushes against the rose chafer. The application must be repeated occasionally in order to destroy the

p 121
Potato vines were sprayed with kerosene emulsion 1-15. No further trouble was experienced from the flea beetles.

Summary of insecticides pp 128-129.
To destroy sap sucking species including the peach aphis and other plant lice, squash bugs, as well as rose chafers and leaf hoppers, use kerosene emulsion. It is prepared as follows: Kerosene 2 gals., common soap 1/2 lb., water 1 gal. Dessolve soap in boiling water and while boiling add the oil emulsify the mixture by passing thru a force pumpwith spray nozzle attached. Dilute with 9 to 15 parts of water when using, so that it will not be stronger than 1 part oil to 15 parts water.

138
1891 - Beckwith, M.H.

Pyrethru-kerosene emulsion.
In Report of the Entomologist, 4th Ann. Rept. Del. Coll. Agr. Expt. Sta. for 1891, pp. 97-98.

This emulsion was prepared according to Dr. Menkes' formula of the Arkansas Agr. Expt. Sta. 3 qts. kerosene were mixed with 1½ lbs. of pyrethrum powder in a closed vessel and allowed to stand four days. 2½ qts of this kerosene extract was added to the same am't of boiling water in which 10 oz. common hardsoap had been dissolved. A perfect emulsion was formed after pumping thru a force pump. Some of the emulsion was diluted with 150 parts water and used on rose aphids with success. Cherry aphis were killed using it 1-300, cabbage aphis also was killed with 1-150. Applied to cabbage infested with larvae of Pieris rapae, Pionea rimosalis and Ceramica picta. The worms began to writhe as soon as touched by the liquid and fell to the ground and were soon lifeless.

139
1891- Beckwith, M.H.

Injurious insects and insecticides.
Delaware Coll. Agr. Expt. Sta. Bul. 12, 28 pp.

Kerosene emulsion 1-15 was used with success on the black peach aphis. Experiments were made on the rose bug which showed that it can be controlled by an emulsion diluted 1-5. Black flea beetles were controlled with kerosene emulsion 1-15. Formula for kerosene emulsion: Kerosene 2 gals., common soap 1/2 lb., water 1 gal. Dissolved soap in boiling water, while boiling add the kerosene, emulsifying with a force pump equipped with a spray nozzle. Diluted with 9 to 15 parts of water so that it will not be stronger than one part oil to 15 parts of water.

140
1891. Beckwith, M. H.

Practical Notes on the use of insecticides.

Insect Life, Vol.III, No.6, p.269-275.

Kerosene emulsion was used on aphids of apple trees with fair success.

141
1893 - Beckwith, M.H.

The strawberry root aphis. Report of the Entomologist, 6th Ann. Rept. Del. Coll. Agr. Expt. Sta. for 1893. pp. 168-171.

Kerosene emulsion proved effectual in destroying the insects without injury to the plants, by using a sufficient quantity upon the plant to saturate the soil about them and thus reach the roots.

142
1895. Beckwith, M. H.

San Jose scale in Delaware.

Delaware Agr.Expt.Sta.Bul.25.

While in foliage the trees should be thoroly sprayed with strong kerosene emulsion, 1 part emulsion to five parts of water. Several treatments may be necessary in order to entirely rid the trees of scale.

143
1897. Beckwith, M. H.

The present status of the San Jose scale in Delaware.

Delaware Agr.Expt.Sta.8th Ann.Rept.for 1896, pp.117-124.

Kerosene emulsion was applied as a summer spray on plum trees. It destroyed the young insects which were crawling about on the trees and also many of the mature insects.

144
1895 - Beckwith, M. H.

Report of the Entomologist, In 7th Ann. Rept. Delaware Coll. Agr. Expt. Sta., for 1895, pp. 160-175.

For San Jose scale a substance of an oily nature such as kerosene emulsion is used. The oil penetrates between the scale and bark, thus destroying the insects. While foliage is upon the tree it is advised to spray with kerosene emulsion 1-5. Several treatments may be necessary to rid the trees of the insects.
Plum scale may be destroyed by spraying kerosene emulsion 1-4, kerosene emulsion is used as spreader when spraying with London Purple or Paris green against the elm leaf beetle.

190[illegible] - Bedford, Duke of (11th)
145
The Current [illegible]
[illegible] Fruit Farm [illegible], 190[illegible], [illegible]

[illegible]

146
Bedford, (11th) Duke of- and Pickering, Spencer N.
1906. Woburn Experimental Fruit Farm 6th Rpt. (London) VI+ 235 p.

See Supplementary abstract.

147
Bedford, (11th) Duke of- & Pickering, S. U.
1908. Eighth report of the Woburn Experimental Fruit Farm.
Woburn Expt. Fruit Farm. Rpt. Vol. 8 pp. IV+ 127.

See Supplementary abstract

191[illegible] - Bedford, Duke of (11th) & Pic[illegible]
148
[illegible] Fruit Growing [illegible]
[illegible] II + 351 p.

[illegible] pp 151-1[illegible]
[illegible]
Nursery stock was successfully [illegible] in [illegible] injury. Weather conditions [illegible] affect the results of spraying with oils. [illegible] oil [illegible] injurious to trees than a [illegible] tion of the oil. Paraffin oil is more active on stocks and scions of nursery stock than on the roots. The size of oil particles in a paraffin emulsion is generally about 0.0075 mm.
The nature of action of paraffin on plants and insects is discussed.

149
1917. Benedict, R.C.

An outline of the life-history of the clothes moth, Tineola biselliella.
Science, Vol.XLVI, No.1193, pp.464-466.
Kerosene and gasoline fumes were not effective against the clothes moth larvae.

150
1[illegible]. B[illegible] A. H.

Apple culture.
[illegible] Vol.5, pt.6, pp.391-405.
The following formula for kerosene emulsion is given: 1 gal. of best kerosene, 1 gal. boiling water and 8 oz. of soft soap. It is emulsified in the usual way. It is safer to use the best kerosene in preference to the blue oil or wood preserving oil, as the latter always contains more or less volatile oils which will not emulsify, and always destroys the foliage more or less. This emulsion is used on mussel scale 1-15 or 20 and also on the greedy scale.

151
1901 - Benson, A.H.

San Jose scale

Queensland Agr. Jour., Vol.[illegible], No.[illegible], pp.451-454

Kerosene sprays are not recommended. ~~for use~~.

152
1899 - Benson, A.H.

Annual Report of the instructor in fruit culture

Queensland Dept. Agr. Rpt. 1898-99, pp 30-41

Summer spraying with kerosene emulsion proved very satisfact[illegible]

153
1903 Benson, A.H.

The destruction of fruit insects

Queensland Agr. Jour. Vol.13, No.6, pp 533-

The R & H. formula i[illegible]

154
1912 - Berger, E. W.

Report of the Entomologist, Florida Agr. Expt. Sta. Report, 1911, pp. XL, LVII.

Difficulty was experienced in the use of hard water in oil emulsions and miscible oils. By adding soap to the water before diluting the separation of oil is prevented. Sodium carbonate, caustic soda, and borax were tried but results were less certain than with soap. Lime sulphur, soda-sulphur and sulphur, were mixed with oil emulsions and miscible oils for white flies. Lime sulphur will not mix with them without injury to the mixture. The soda-sulphur and flowers of sulphur mixed well. With the emulsion and miscible oils the flowers of sulphur formed a thick scum. The formation of the scum was obviated by first treating the water with whale oil soap, using sufficient to soften the water. Black leaf 40 in kerosene emulsion caused a separation of the kerosene.

155
1917. Berger, E. W.

Control of scale insects, or coccidae, in Florida

Qtrly.Bull.Florida State Plant Bd., Vol.11, No. 1, pp.66-81.

Yothers' formulas for making lubricating oil emulsions are given. Also the R & H formula for making kerosene emulsion.

156
1914. Bernier y Lan

Como luchar contro los insectos que molestan a los animales.

Gaceta Rural Vol.18, No.85, p.140.

Kerosene 1 part and olive or cotton seed oil 1[illegible] parts are mixed and rubbed on domesticated animals to rid them of fleas and lice. The vegetable oil serves as a solvent and spreader for the kerosene and mitigates the irritating effect of the latter on the skin.

157
1907. Bethune, C. J. S.

Insects Affecting Fruit Trees.

Ontario Dept.Agr.Bul.158, 36 pp.

The R & H formula for kerosene emulsion is given.

158
1908. Bethune, C. J. S.

Entomological Notes.
33rd Ann.Rpt.Ontario Agr.Col.& Expt.Farm, for 1907, pp.52-63.
Kerosene-flour emulsion at 11% strength was tried on two apple trees with very good success. The mixture was made as follows: 5 lbs.flour; 5 gals.of kerosene and 40 gals. of water. The ordinary kerosene emulsion formula was tried on two other apple trees with success. These emulsions were used for the oyster shell scale.

159
1909. Bethune, C. J. S.

Report of the professor of Entomology and Zoology.
34th Ann.Rpt.Ontario Agr.Col.and Expt.Farm, for 1908, pp.24-35.
Kerosene emulsion used when the young of the oyster shell scale are crawling is a very effective remedy.

160
1915. Bevan, E. W.

Ticks and animal diseases.

The Rhodesia Agric.Jour.Vol.12, No.6, pp.766-784.

The following dip formula is given: Soft soap 3 lbs, kerosene 1 gal., arsenite of soda (80% arsenic) 4 lbs, water 400 gals.

161
1921. Beyer, A. H.

Garden flea-hopper in alfalfa and its control.

U.S.D.A. Bull. 964, 27 pp.

Kerosene emulsion made by the R & H formula is effective for the flea hopper on alfalfa when used in a 10% solution.

162
192[illegible]. Beyer, A. H.

Experiments on the biology and tipburn disease of the bean leafhopper with methods for control.

Jour.Econ.Ent.Vol.15, No.4, pp.298-302.

Kerosene emulsion 7% gave only 81 per cent kill of adults and nymphs, and 66% control of tipburn.

163
Bhatnagar, S.S. Emulsions. III. Reversal type of electrolytes. Jour. Chem. Soc., vol. 119, 1921, pp. 1760-1769. Chem. Abs., vol. 16, Mar.,10, 1922, p. 669. Results of a study of the effects of different types of electrolytes on various emulsions.

164
Bhatnagar, S.S. and Garner, W.E. The effect of the addition of certain fatty acids on the interfacial tension between B. P. paraffin oil and mercury, Jour. Soc. Chem. Ind., vol. 39, July 15, 1920, pp. 185T-187T. Results of experiments.

165
1921 Bigalke

Fleas on Chicks

Jour. Dept. Agr. Union S. Africa, Vol. 3, No.5 p. 409

Kerosene 1 pt and lard 2 pts is a remedy advocated for the fleas. The runs where the fleas breed may be saturated with kerosene.

166
1911-- Billings, F.H. & Glenn, P.A.
Results of the artificial use of the white-fungus disease in Kansas, with notes on approved methods of fighting chinch bugs.

USDA. Bur. Ent. Bul. 107; pp. 58.

Oil barriers are recommended to keep the bugs from the fields. When they are on the edge of the field, spraying with kerosene emulsion or crude oil is effective.

167
19[illegible] Bingham, Eugene C., Rolland, Guy F., and Hilbert, G.E

[illegible]. J. [illegible]. [illegible] 17, [illegible].

An emulsifier; contains saponin.

168
1913-Bishopp, F.C.

The Fowl tick

U.S.D.A. Bur.Ent.Circ. no.170; 14 pp.

Spraying buildings with kerosene, gasoline and kerosene emulsion will help to clean up the ticks.

169
1913. Bishopp, F.C.

The Stable Fly (Stomoxys Calcitrans, L.) an important live-stock pest.
Jour. Econ. Ent., vol. 6, No. 1, pp. 112-126.

A mixture of fish oil, oil of tar and oil of pennyroyal, with a little kerosene added was most effective as a repellant. Deep narrow trenches oiled with crude petroleum afford protection to hogs and sheep.

170
1915. Bishopp, F. C.

Fleas.

U.S.D.A.Bul.248, 31 pp.

A mixture of 1 part kerosene and 3 parts lard gives fairly good results on the chicken flea or sticktight.

171
1915. Bishopp, F. C.

The stable fly.

U.S.D.A.Farmers' Bul.540, 28 pp.

A mixture of fish oil 1 gal., oil of pine tar, 2 ozs., oil of pennyroyal 2 ozs., and kerosene 1/2 pt. was found to be very effective in keeping flies off live stock when applied lightly, but thoroughly.

172
1915. Bishopp, F.C.

Fleas as pests to man and animals, with suggestions for their control.

U.S.D.A.Farmers' Bull.683, 15 pp.

Fleas on hogs may be destroyed by sprinkling crude petroleum on them when they are eating.

173
1917. Bishopp, F.C. & Wood, H.P.

Mites and lice on poultry.

U.S.D.A. Farmers' Bull. 801, 26 pp.

The common mite breeds in the cracks of the roosts and buildings. It may be destroyed by two or three applications of crude petroleum or kerosene to the roosts and buildings.

174
1917. Bishopp, F. C. & Wood, H. P.

Preliminary experiments with sodium fluoride and other insecticides against biting and sucking lice.

Psyche, Vol.24, No.6, pp.157-159.

The R & H formula for kerosene emulsion is given.

175
1917 Bishopp, F.C.

Some problems in Insect Control about Abattoirs and Packing Houses.

Jour. Econ. Ent., vol. 10, no. 2, ~~1917~~, pp. 269-277.

Crude petroleum oil was helpful in preventing breeding of flies in soil soaked with blood.

176
1919. Bishopp, F.C.

The fowl tick and how premises may be freed from it.

U.S.D.A.Farmers' Bul.1070, 16 pp.

Crude petroleum is a satisfactory material for use against the fowl tick in chicken houses. Kerosene and gasoline are unsatisfactory.

177

Bjerregaard, A.P. Effect of paraffin wax on the properties of mineral oils. Jour. Ind. and Eng. Chem., vol. 14, Mar., 1922, pp. 215-217. A study of the effect of paraffin wax on the viscosity, freezing point and specific gravity of various oils and mixtures of oils.

178
1902. Blair, W. S.

Kerosene emulsion for the oyster-shell back louse.

Canada Expt.Farms Repts. 1901, p. 380.

The R & H formula is given.

179
1922. Blatt, R. J.

The Psylla pest.

Jour.Dept.Agric.Union S.Africa, Vol.V, No.1, p.26.

Miscible oil, a light distillate emulsion, or a crude carbolic acid emulsion is recommended for the control of the psylla.

180
1872. Bliss, O. S.

Lice on cattle.

Country Gentleman, April 18, 1872, p.250.

Lice may be removed from cattle by pouring a small quantity of kerosene on the card with which they are carded.

181
1914. Bodkin, G. E.

The scale insects of British Guiana.

Jl. Bd. Agric. Brit. Guiana, Vol. VII, No. 3, pp.106-124.

The R & H formula for kerosene emulsion is given.

182
1916. Bodkin, G. E.

Report of the economic biologist.
Rept.Dept.Sci.& Agric. B.Guiana, for the nine months ended 31st Dec., 1915, appendix III, 10 pp.
Roses and bougainvillias are cleared of the coccid Orthezia insignis Doug., by several applications of kerosene emulsion.

183
1918. Bodkin, G. E.

The destructive South American locust in British Guiana. An account of the recent locust infestation.
Jl. Bd.Agric.Brit.Guiana, Vol.XI, No.1, pp.3-10.
The locust may be killed by driving them into a ditch where the surface of the water has been coated with kerosene.

184
1919. Bodkin, G. E.

Bites and stings.

Jl. Brit.Guiana Bd., Agric., Vol.XII, No.2, pp.94-101.

Kerosene placed on the mouth parts of an engorged tick will cause it to loosen its hold.

185
1922. Bodkin, G. E.

Report of the government economic biologist.

Rept.Dept.Sci.& Agric.Brit.Guiana, 1920, Appx. 111, pp.51-58.
A mixture of creosote 1 oz. and kerosene oil 3 oz. was injected into the burrows of the giant castnia borer of the cocoanut palms. This treatment was effective.

186
1896. Bogue, E.E.

The melon louse.

Oklahoma Agr.Expt.Sta.Bul.20,pp.22-23.

The R & H formula for kerosene emulsion is given.

1897 - Bogue, E. E.

187

Some injurious orchard insects

Okla. Agr. Exp. Sta. Bul. 26, 23 pp.

Kerosene emulsion formula: Soap 1-1/2 lbs: kerosene 2 gals; rain water 1 gal.

The water is heated to boiling and then the soap is dissolved in it. When cool the kerosene is added and agitated until a creamy mass is found. This stock diluted with 9 parts water may be applied to all sucking insects.

188
1899-1900 Bogue, E. E.

Insects affecting the grape

Oklahoma Agr. Exp. Sta. Rpt. 1899 & 1900, pp 108-115

The R & H formula for kerosene emulsion is given using hard soap. If soft soap is used equal quantities of soap and oil are taken and the water is omitted before mixing. The mixture is stirred violently with a force pump to a creamy mass. The emulsion is then ready to dilute. For scale insects and hard bodied insects, use the emulsion 1-8, For soft bodied insects 1 part to 15 or 20 parts of water.

189
1922. Bondar, Gregorio.

Insectos nocibos e molestias do coqueiro (cocos nucifera) no Brasil. Bahia 111 p.

Kerosene had little effect; benzine, however, killed larvae of Rhyncophorus palmarum in 3-5 min. Treatment for scales: 500 g. common soap, 4 liters H_2O and 8 liters kerosene are emulsifed hot. Dilute 1 - 9.

190
1923. Bondar, G.

Formiga "Quem-Quem" do cacao.

Correio-Agricola,Vol.I,No.10,pp.251-254,Bahia, Oct.1923.

The nests are stirred up and kerosene is poured in them, about one can being used for each ant hill. Kerosene is here called gas.

This method is widely used here, hundreds of cans of kerosene being consumed per year.

191
1924. Bondar, G.

Praga das Roseiras na Bahia (A pest of Roses in Bahia).

Correio-Agricola,Vol.II,No.2,pp.46-47,Bahia, Feb.1924.

Cut 1 kg. soap in chips and dissolve them in boiling water; add 8 liters of kerosene stirring it well, till a homogeneous mixture is obtained.

Used against: Stylothrips bondari Morg).

192
1921. Borden, A.D.

A biological study of the red date palm scale, Phoenicococcus marletti.

Jl. Agric.Research,Vol.21,No.9, pp.659-668.

The following spray formula is recommended for the control of the scale: Cresol U.S.P. 1 part, distillate or kerosene 4 parts, water 50 parts. The spray must be repeated consistently to reach the maximum number of scales.

193
1922. Borden, A. D.

Control of the citrus red spider.

Mthly.Bull.Cal.State Dept.Agric.,Vol.XI,No. 7, pp.36-39.

A cresol soap distillate oil emulsion proved effective on the citrus red spider.

194
1923. Borden, A.D.

Control of the common mealybug on citrus in California.

U.S.D.A.Farmers' Bul. 1309, 10 pp.

See Farmers' Bul. 862 for the cresol, soap, distillate formula.

195
1913. Boucher, W. A.

Orchard work for September.

Jour.Dept.Agr.N.Zealand,Vol.7,No.2,pp.189-190.

The R & H formula is recommended for scale insects on citrus trees.

196
1908. Bradshaw, G.

Diseases of fowls. The chicken mite.

Agric.Gaz.of N.S.W.,Vol.19,No.3,p.219-222.

Kerosene emulsion made by the R & H formula not only kills the mites but also their eggs, when it comes in contact with them.

197
1918. Brain, C. K.

Pernicious Scale.

Union S. Africa Dept. Agric., Local Ser. 61, 4 pp.

A control measure adopted for the sacle consists of spraying with miscible oils. Scalecide, Gargoyle Red spraying oil and Harbas spraying oil may be used.

198
1918. Brain, C.K.

Storage of Manure and Fly Suppression at Durban remount depot.

Jour. Econ. Ent. vol. 11, no. 3, pp. 339-341.

Caustic Soda	2 lbs.
Boiling H_2O	50 gals.
Paraffin	5 gals.
Hycol (Lysol?)	5 gals.

This mixture used to spray stalls as a Contact for flies.

198a
1911. Brereton, W. [LeGay]

Experiments with red oil emulsion against green aphis on peach trees at Glen Innes Expt.Farm Orchard.

Agr.Gaz.N.S.Wales,Vol.22,No.4,p.334.

The emulsion was mixed by the follwing formula: 1 gal.red oil, 1 lb.common yellow soap,20 gals.water. It was applied when the trees were quite dormant. Later upon examination no aphis could be found on the treated trees, whereas the untreated trees were badly infested.

199

Briggs, T. R. Experiments in emulsions. III. Jour. Phys. Chem., vol. 24, Feb., 1920, pp. 120-126. On emulsions by shaking.

200

Briggs, T. R., Du Casse, F. R. and Clark, L. H. Experiments in emulsions. IV. Jour.. Phys. Chem., vol. 24, Feb., 1920, pp. 147-160. On pharmaceutical emulsions.

201
1915 Briggs, T. Roland and Schmidt, Hugo F.

Experiments on emulsions II. J. Physical Chem. 19, 479-499

Water - oil emulsions

202
1896. Bristol, W. M.

Kerosene straight as a scale destroyer.

Cal.Cultivator,Vol.10,No.12,Dec.1896,p.36.

Pure kerosene may be used with success on trees as reported by Webster of Ohio.

203
1903 - Britcher, H.W.
The Chinch Bug in Maine.
Maine Agr. Expt. Sta. Bul. 91, pp.41-52.

Chinch bugs are quickly killed by kerosene or kerosene emulsion, but it is essential that they be thoroly applied. Sprinkling freely over the infested spots will usually be effectual although it may kill the grass also.

204
Britton W.E.
1898.

Insecticides: Their preparation and use.

Conn. State Agr. Expt. Sta. Bul. 126, pp. 3-12.

Kerosene: This has been used to kill Jose scale. Injury has followed its use and it has also been successful. Kerosene should be applied in the form of a very fine spray at a time when the tree is perfectly dry and when the material will evaporate quickly. It should not be used on a damp or cloudy day. Kerosene & Water: A mixture of kerosene and water is much less injurious to foliage than the pure oil and kills some insects quite as readily. Kerosene Emulsion: Kerosene 2 gals. common or whale oil soap 1/2 lb, water 1 gal. Dissolve the soap in water and while boiling hot add the kerosene and emulsify. This may keep indefinitely, and for use should be diluted with 10 or 15 times its volume of water.

205
1898. Britton, W.E.

The San Jose scale in Connecticut.

U.S.D.A.Div.Ent.Bul.17,n.s.,pp.81-84.

Pure kerosene was sprayed on Japan plum trees; no living scale could be found two months later. Where the kerosene was applied with care, little or no injury resulted.

206
1899. Britton, W. E.

Entomological Notes.
22nd Ann.Rept.Conn.Agr.Expt.Sta.1898,p.269-75.
Pure kerosene was applied with good results to Japan plum trees seriously infested with San Jose scale. The trees were not injured. A 20% mixture of kerosene and water is a better spray for the average gr

207
Britton, W. E.
1901

Miscellaneous notes on insects and insecticides. Rept. Conn. Agr. Expt. Sta. for 1900 (1901) pp.314-22.

See Supplementary abstract.

208
Britton, W. E.
1901.

San Jose Scale Insect: Its appearance and spread in Connecticut.

Crude oil, applied just before leaves are out, or a mixture of kerosene and water (20-25%) kerosene) applied at the same time, are beneficial. Crude oil has the advantage of remaining on the bark for several months. Either of these oils if applied thoroughly will kill the insects without serious injury to the trees. It is not safe to apply any form of petroleum on a damp and cloudy day.

209
~~Britton, W. E.~~
1902.

Experiments in Spraying to kill the San Jose Scale, season of 1902, ~~(pp. 114-127.)~~

2nd Report of the State Entomologist Connecticut State Agr. Sta. Rpt. 1902, pt. 2, pp. 99-178.

See typed abstract.

See Supplementary abstract

210
Britton, W. E.
~~1902.~~

Preliminary experiments in spraying to kill the San Jose scale insects in 1901. Conn. State Agr. Expt. Sta., Bul. 136. 12.p.

Crude oil having a specific gravity of 43° Be. and a kerosene and water mixture containing 20% of kerosene were both effective in destroying the San Jose scale where applied to dormant trees just before growth started. and did no harm to the trees. The scale may be checked on peach trees in foliage by spraying with kerosene and water mixture containing 15% kerosene without serious injury to the trees, but was not as effective in destroying the scale when applied during the latter part of June as when applied a month later. 15% & 10% crude oil mixed with water caused injury to peach foliage. Kerosene emulsion containing 25% kerosene is effective in destroying scales on dormant trees.

211
Britton W. E.
1902,
The white fly or plant house aleurodes.
Conn. State Agr. Expt. Sta. Bull. 140, 17 pp.

A fine spray of kerosene and water (15% kerosene) was applied to the tomato plants with good results. It causes occasional injury to the foliage.

212
Britton, W. E.,
1903.
Two common scale insects of the orchard.
Conn. State Agr. Expt. Sta. Bul. 143, 10 pp.

Frequently the eggs withstand application of kerosene and crude oil. When the young scales are crawling, kerosene emulsion is recommended and a mechanical mixture of kerosene & water, containing 10-15% kerosene, applied with a "Kerowater" pump is also a cheap and satisfactory remedy.

213
1902. Britton, W. E.

The lime, sulphur and salt mixture in Connecticut.

U.S.D.A.Bur.Ent.Bul.40,n.s.,p.38.

This mixture was used in comparison with 25% crude oil mixed with water. Injury to the trees followed the use of the crude oil. The kill in scale was apparently equal with the two mixtures.

214
1903. Britton, W. E.

Experiments in spraying to kill the San Jose scale insect, Season of 1902.
Second Ann.Rept.of Entomologist of Connecticut, for 1902, p.114-125.
Three crude oils were used: (1) Standard Oil Co. testing 43° Be. (2) Derrick Oil Co.,45°Be (3) A black oil 35.8°Be. These three oils were used in 25% mixture with water, and the first two undiluted. They were effective in killing the scale, but damaged the trees in some cases. 25% kerosene in water was effective on the insects and caused only slight injury to the trees.

215
Britton, W. E.,
1906.

Sixth Report of the State Entomologist.
Conn. State Agr. Expt. Sta. Rpt. 1906, Pt. 4, pp. 219-306.

Nursery trees infested with San Jose scale were sprayed with scalecide with satisfactory results. Scalecide was also used in San Jose scale spraying experiments at dilutions of 1-14, 1-20, and 1-25, which gave fairly good results. Surekill was also used at a dilution 1-25 but with less satisfactory results. These materials are a new form of scale insecticide. The basis is petroleum, with heavy and light ingredients removed, and some of them contain proportions of resin oil and vegetable oil, the whole treated with caustic soda or some other alkali, to render them miscible with water.

215 b
1906 - Britton, W.E.
Destroying the woolly maple leaf scale by spraying.
USDA Bur. Ent. Bul. 60, p. 161-2.

A kerosene emulsion made by the R & H formula with common hard soap was not effective against the woolly maple leaf scale. When soft naphtha soap was used in place of the hard soap and cold water instead of hot water, the results were much better. This was diluted 1-5.

216
Britton, W. E. & Walden, B. H.
1908

Experiences with Home-made soluble oils and some other spray mixtures. Report of the State Ent. Conn. for 1907-08, pp. 837-842.

See Supplementary abstract

217
Britton, W.E.
1912.

Mosquito Plague of Connecticut Coast Region, and how to control it. Report of the Conn. Agric. Expt. Sta., 1912, pp. 259-283.

Mosquito larvae wrigglers may be killed in a few minutes by spreading a film of oil over the surface of the water. The oil not only prevents the air from entering their respiratory system, but the oil also enters their breathing tubes, destroying the tissues, and they soon die. Oil must be applied once each ten days. It is applied by means of small compressed air sprayer with cylinders of galvanized sheet iron using about 1 fluid ounce of oil to each 15 sq. ft. of water space.

218
1913. Britton, W. E.

Mosquito Control Work in Connecticut in 1912.

Jour. Econ Ent., vol. 6, no. 1, pp. 89-93

Oiling with kerosene and a light fuel oil known as "[illegible]" distillate. The latter is more injurious to vegetation and to various aquatic animals besides mosquito larvae than kerosene. Effective against fresh water and salt marsh mosquitoes.

1915, Britton, W. E
219 The cabbage root maggot

14th Ann. Rept. Entomologist Conn. Agr. Exp. Sta., for 1914, pp 142-152

The R & H formula is given for use on the cabbage root maggot when diluted 1-9.

220
Britton, W. E.
1918.

Insects attacking the potato crop in Connecticut.

Conn. Agric. Expt. Sta. New Haven, Bull. 208 (Entoml Ser. No. 26). p. 103-119.

Kerosene emulsion formula for the potato aphid is: Laundry soap (about 30 oz.) 3 cakes; kerosene 4 gals. water 2 gals. After churning dilute 8 times to make 1 barrel (50 gals). All the aphids hit by the spray were killed without injury to the plants. The aphids disappeared soon after and no further treatment was necessary.

221
Britton, W. E.
1919.

18th Report of the State Entomologist of Connecticut for 1918.

Conn. Agric. Expt. Sta. Bull. 211, pp. 249-352.

Recommends miscible oil in late spring just after the buds begin to swell.

222
Britton, W. E.
1919.

Insects attacking squash, cucumber, and allied plants in Connecticut.

Conn. Agric. Expt. Sta. Bull. 216, (Entomological Ser. No. 27). pp. 32-51.

The melon aphid may be controlled by spraying with kerosene emulsion made according to the following formulas: Laundry soap(about 30 oz.) 3 cakes; kerosene 3 gals. water 2 gals. After churning, dilute 8 times to make one barrel (50 gals.). This should be sprayed on the under surface of the leaves.

223
Britton, W. E.
1920.

19th Rept. of the State Entomologist of Connecticut for 1919, Conn. Agric. Expt. Sta. Bull 218, pp. 112-208.

Kerosene emulsion was used with success on the pine bark aphid. Kerosene 2 gals, common laundry soap 1 lb., water 1 gal. Dissolve soap in hot water, add the kerosene and churn together. Dilute nine times before using.

224
Britton, W. E.
1921.

20th Report of the State Entomologist of Conn. for 1920. Conn. Agric. Expt. Sta. Bull. 226, pp. 137-215.

Juniper scale may be controlled by several applications between June 1 & Sept. 1, of kerosene emulsion.

225
Britton, W. E.
1923.

22nd Report of the State Entomologist for 1922 Connecticut Agric. Expt. Sta., Bul. 247, pp. 269-381.

Spraying tests for San Jose scale:
Scalecide 1-15 & Keresol 1 gal. in 18 gals. of water were used. Keresol is an oil mixture containing about 70% of keresene. Scalecide gave the best control (97.2%); Keresol the lowest (68.9%) which may possibly be due to too dilute a mixture, though the manufacturers directions were followed. Kere-spray was used 1-100 on European red mite, with very little success. A miscible oil was used 1-20 on the spruce gall aphid in the spring. The same treatment was used in the fall. Both were effective in controlling the aphid. For ants on trees and plants kerosene emulsion is probably the best treatment.

226
Britton, W. E.

1924.

Twenty-third report of the State Entomologist of Connecticut, 1923. Conn. Agric. Expt. Sta. Bull. 256, pp. 223-316.

Mosquito wrigglers may be killed by spreading a film of oil on the surface of the water. This prevents their access to the air and they suffocate. The oil also penetrates their respiratory system and injures their tissues. Kerosene or light fuel oil may be used.

227
1905. Britton, W. E. & Vierick, H. L.

Report on mosquito investigations.

4th Rept. of Entomologist of Conn. Agr. Expt. Sta. for 1904. pp. 253-

Pools that can not be drained or filled in should be treated every ten days with kerosene or light fuel oil.

228
Britton, W. E. & Walden, B. H.
1903.
Fighting the San Jose Scale insect in 1903. Conn. State Agr. Expt. Sta., Bull. 144.

Kerosene emulsion was applied on Aug. 10 to kill the young and prevent the very rapid multiplication of the scales for the season. Two formulas were employed: (1) 1/2 lb. common soap, 2 gals. kerosene, 28 gals. water will give a 6.6% kerosene emulsion. (2) $\frac{3}{4}$ lbs. common soap, 6 gals. kerosene, 34 gals. water will make a 15% kerosene emulsion. No injury was done by either of these emulsions. The results of this summer treatment were unsatisfactory.

229
1906. Britton, W. E. & Walden, B. H.

Combatting the San Jose scale in 1905.

5th Ann. Rept. Entomologist, Conn. (New Haven) Agr. Expt. Sta. Rept., for 1905, pp. 196-207.

K-L mixture gave the lowest percentage efficiency of the mixtures tested. It was fairly effective as a scale destroyer.

230

Britton, W. E. & Walden, B. H.
1908.

Seventh Report of the State Entomologist, Spraying tests with Commercial & Soluble Oils" to kill the San Jose scale.

Conn. State Agr. Expt. Sta. Rept. 1907-1908, Pt. 5, pp. 266-338.

Young apple trees were treated with "Scalecide," "Target Brand scale destroyer", and "Killo-scale". These were similar in composition and method of application except that Kill-o-scale contains an addition of sulphur, while the others do not. Tests showed that all three products were about equally effective when used in the proportions of 1-15. Very few scales survived the treatments. All fruit trees on station grounds were sprayed with Scalecide 1-15 in the fall. When examined in March very few living scale could be found. Cautions for the use of soluble oils: The contents of original containers should be well shaken or stirred before mixing with water. Directions given by manufacturers should be followed. If such precautions are taken there will probably be no injury to trees from use of soluble oils. A large tree sprayed with one of these oils which was not properly stirred had the leaf and blossom buds killed on certain branches. Adventitious buds appeared and later the tree was uniform in foliage.

231

Britton, W. E. & Zappe, M. P.
1919.

Tests of sprays to control the potato aphid.

18th Rept. Conn. State Entomologist, for 1918. Conn. Agric. Expt. Sta. Bull. 211, 1919, pp. 294 - 297.

In the regular formulas for making kerosene emulsion, there seems to be too much kerosene for the soap and some "burn" or injury resulted. The following formula was used: Kerosene 4 gals, soap (about 30 oz.) 3 cakes, water to make 50 gals. This was very effective in killing the aphids; A slight injury to the foliage was noticed. Then the following formula was used. Kerosene 3 gals, soap (about 40 oz) 4 cakes; water to make 50 gals. This formula seemed to be just as effective in killing the aphids as the preceding and there was no injury to the foliage.

232

1919. Britton, W.E. and Zappe, M.P.

Kerosene emulsion vs. Nicotine solution for combating the potato aphid.

Jour, Econ, Ent, vol 12, no. 1, pp. 77-81
Formula: Kerosene 4 gals; Laundry soap, 30 oz, hot water, 2 gal. field to 50 gal. i.e. 8 c/c oil concentration was effective as nicotine (1 pt. 40% per 50 gals.)

233

1922-Britton, W. E., & Zappe, M.P.

An outbreak of the arbor vitae leaf miner.
Conn. Agr.Expt.Sta. Bul. 234, pp.157-160.

The following sprays were applied: Scalecide 1-8, which showed very little burning on the new and tender growth & kero-spray 1 pint to 8 gals. which is a commercial kerosene emulsion.

234

Britton, W. E. & Zappe, M. P.
1922.

Miscellaneous Insect notes, Conn. Agric. Expt Sta., New Haven, Bull. 234, pp. 194-202.

Kerosene emulsion made as follows: kerosene 2 gals. water 1 gal., soap 1/2 lb. Dissolve soap in hot water add kerosene and churn until creamy emulsion appears. Dilute 9 times. This was effective in controlling the Rhododendron Lace Bug but more troublesome to prepare than some other sprays. Scalecide 1-25 was also tried, but was ineffective.

235

1919 - Brock, W. S. & Flint, W. P.

Field Experiments in Spraying for Control of San Jose Scale, 1919.
Univ. Ill. Agr. Expt. Sta. Circ. 239, 4 p.

Scalecide was used in tests with various other sprays. Diluted 1-15 it gave excellent control.

1915? Brooks, F.E.

236

U.S.Dept.Agr. Farmers Bul. 675

Kerosene against Saperda candida on apple.

237

1919. Brooks, F.E.

The flat-headed apple-tree borer.

U.S.D.A.Farmers' Bul.1065,12 pp.

Kerosene emulsion as a spray has proved disappointing for controlling the flat-headed apple tree borer.

238

1920. Brooks, F.E.

Round-headed apple tree borer: Its life history and control.
U.S.D.A. Bull.847. 42 pp.
Kerosene does not penetrate through the bark in sufficient quantities to kill all the borers and is also dangerous to the trees. Sodium arsenate with miscible oil as a carrier was of no practical value. Kerosene emulsion was not effective.

239

1920. Brooks, F.E.

Pear borer.
U.S.D.A. Bull. 887, 8 pp.
Kerosene emulsion and the standard emulsified oil sprays, with small quantities of sodium arsenate added, when applied to the bark over the burrows killed as high as 85% of the borers. The heavy mineral oils should be used with caution until assured of their non-injurious effects upon the trees.

240

1911. Brooks, O.

Red oil for scale on citrus trees.
Agr.Gazette of N.S.W.Vol.22,No ,p.1072.
Red oil was used for red scale, olive scale, and white louse on citrus trees. The proportions used were: 1 gal.oil, 2 lbs.soft soap, 30 gals. water. This spray was very effective. Injury resulted when this spray followed a soda wash. The soda has a tendency to dry the sap from the tree and weaken it. Red oil is very effective for San Jose scale on apples at 1-30.

241

1904. Brown, A. N.

Experience with limoid and kerosene.

Rural New Yorker,Vol.LXIII,No.2861,p.843.

K-L mixture was used with success on the San Jose scale without injury to the trees. A 10% strength kills the young scale but not the old scale. A 20% mixture can be used on dormant trees to kill the old scale.

242

1905. Brown, A. N.

Spraying with the new K-L mixtures.

Can.Hort.Vol.28,No.5,p.176.

The K-L emulsion is given. It can be combined with Bordeaux mixture without affecting the action of either.

243

1918 - Brown, H. D.

Control of Plant Lice in the Vegetable Garden.
Univ. Illinois Agr. Expt.Sta. Circ. 227, 4 pp.

Kerosene emulsion is not recommended for the control of plant lice as it is likely to burn the foliage. It can be used with a fair degree of success if tobacco preparation cannot be obtained. The stock solution is made by boiling 1/2 lb. soap in 1 gal. water and pouring this while hot into 2 gals. of kerosene and emulsified in the usual way. It should be diluted with 10 to 20 parts of water for use against plant lice.

244

1918. Browning, ____

Spraying.

Agric.Gaz.of N.S.W.Vol.29,No.10,p.752-3.

When the trees have lost their leaves, winter spraying with one of the proprietary miscible oils is carried out to check the San Jose scale and woolly aphis.

1889 - Bruner, Lawrence.

On certain injurious insects of the year 1888.

Bul. Agr.Expt.Sta. Nebraska Vol. I, no. 5, pp. 135-172.

Kerosene emulsion is recommended for the box elder plant louse, and pure kerosene for the box elder bug.

247
1890 - Bruner, Lawrence.

Insects injurious to young trees on tree claims

Bul. Agr. Expt. Sta. Nebraska Vol. III, no.14, pp. 83-231.

Cook's formula and Hubbards' formula are referred to and methods of preparation are given.

248
1891 - Bruner, L.

Report on Nebraska Insects.

USDA Div. Ent. Bul. 44; pp. 9-18.

Kerosene emulsion is recommended against sucking insects on beets. Also effective against the beet flea beetle.

249
1892 - Bruner, Lawrence.

Notes on certain caterpillars attacking sugar beets.

Bul. Agr. Expt. Sta. Nebr. Vol. V; no.24, (pp.7,

Kerosene emulsion can be used with success against garden webworms with they are quite small; but later they are less susceptible.

250
1893 - Bruner, Lawrence.

Some insect enemies of sugar beets.

Bul. Nebr. Agr. Expt. Sta. Vol VI, no.27, pp.30-33

Kerosene emulsion was used with good results. It can be relied upon if applied in time not only for the webworms, but also for all other insects that attack the beet above ground.

251
1893. Bruner, L.

Locusts in Colorado.

Insect Life, Vol.VI, No.1, p.33-4.

Kerosene was used in the pans of the hopper dozers.

252
[illegible]. Br[illegible], A. W.

Spraying - When, how and why.

Trans.Illinois State Hort.Soc., 1898, Vol.32, n.s.p. [illegible]-251.

The R & H formula for kerosene emulsion is given.

1905 , Bues, C. [Boues ?]

253 Directions for checking the ravages of the cottony scale which frequently causes great havoc and even death to the soft maple shade trees

Wisconsin Agr. Exp.Sta.22nd Ann.Rept. for 1905, p. 315-321

40% kerosene emulsion or kero-water is used as a wash for the trees during the dormant season.

[illegible] - B[illegible]. L. B.

254

Impetigo of the pig

Jour. Dept. Agr. S. Australia, Vol. 22, No. 2, p 110-114.

Whenever lice are found on pigs a 10% kerosene solution is very efficient, but should not be used in hot weather, when it is liable to seriously injure the skin.

255
1925 - Bunker, W. O., & Hirschfelder, Arthur D.

Mosquito repellents. Amer. Jour. Trop. Med. vol. 5, No. 5. pp. 359-383.

The repellent effect of kerosene (b.p. 150°C) was ascertained. In 2 expts. kerosene had an efficiency of 100 & 0; average 50. Efficiency was determined by the formula $\frac{A-C}{A}$, in which A = no.of mosquitoes alighting on control arm & c the no. alighting on test arm.

1920. Bruce, E. A.

Tick paralysis in British Columbia.

Canada Dept.Agric.Health of Animals Branch, Bull.28, 4 pp.

Greasy preparations such as 10 oz.kerosene,10 oz. lard, 2 oz.pine tar, and 1 oz. sulphur; or 1/2 pt. kerosene, 1/2 pt. linseed oil and 1 oz. sulphur will kill these ticks.

256
1907. Burdon, E. R.

The spruce-gall and larch-blight diseases caused by chermes and suggestions for their preventic

Jour.Econ.Biol.Vol.II,No.1,pp.1-13.

The following emulsion gave very good results 2 oz. kerosene, 1/2 oz. soft soap, and 1 gal. water. The emulsion did not injure the foliage.

257
1907. Burdon, E.R.

A remedy for the spruce-gall and larch blight diseases caused by chermes.

Jour. Econ.Biol, Vol.II, No.2, pp.64-7.

The following wash was used with much success: Dissolve 3 lbs. soft soap in 2 quarts boiling water, add 1 pt. kerosene to the above while boiling, and churn to a buttery mass. This stock was then diluted with 5 gals. water. No scorching of the foliage resulted from its use.

258
1902? Burgess, A.F.

U.S.Dept.Agr. Bur.Ent. Bul. 40, p.41.

Crude petroleum against San Jose Scale infesting Peach.

259
1907 - Burgess, A. F.

The San Jose scale problem in Ohio, 1906.

Ohio Dept. Agric. Div. Nursery and Orchard Insp. Bul. 8 30 pp. 11 plates.

Results of tests made with kil-o-scale diluted 1-20 were fair, but when diluted 1-14 the result was excellent. Scalecide gave similar results. These oil sprays were recommended for people who have only a few trees and cannot use lime sulphur wash. The spraying should be done before the leaves appear in the [illegible]

260
1921 Burke, H.E.

Biological Notes on Desmocerus, a genus of roundhead borers, the species of which infest various elders.

Jour. Econ. Ent. vol. 14, no. 5, pp. 450-452

Recommends Craighead Pb arsenate-miscible oil emulsion.

261
1918 - Burnett, J. E.

Methods of Combatting Flies.

Quarterly Bull. Mich. Agr.Coll. Expt. Sta. Vol. 1 No. 1, pp. 18-19.

A good fly repellent that may be mixed at a drug store may be made as follows: 12 oz. crude carbolic acid; 12 oz. turpentine; 12 oz. oil of tar; ½ oz. tannin; make up to 5 gals. with kerosene oil. This mixture should be sprayed on the cows with a hand sprayer just before milking time and will help to keep the cows quiet. This spray will keep the flies away from cows for some little time.

262
1904. Burrell, Mary E.

Kerosene as a remedy for the clover mite.

U.S.D.A.Bur.Ent.Bul.44, p.98.

The kerosene is used undiluted, dipping a cloth and without wringing wiping the sill and lower edge of the window sash. Three applications rid the house of this pest.

263
1923 - Burroughs, A. M.

A new method of making engine oil emulsion.

Mo.Agr.Exp. Sta. Bul. 205, 8 pp.

See Supplementary abstract

264
1923. Burroughs, A. M. and Grube, W.M.

A simplified method for making lubricating Oil emulsions.

Jour. Econ. Ent. vol. 16, no. 6, pp. 53[illegible]-539.

S ee Supplementary abstract

265

Bushong, F.W. and Humphrey, I.W. Use for isomeric naphthenic acids. Petroleum Mag., vol. 11, May, 1921, pp. 162, 164. Results of investigation of the acid constituents of petroleum.

266
1918. Buxton, P. A.

Report on the failure of the date crop of Mesopotamia in 1918.

Agric.Directorate, M.E.F.; Basrah, Bull.No. 6, 6 pp.

A paraffin and soap emulsion is effective for mites on date palms.

267
1917. C, T.

The earwig.

Gardeners' Chronicle, London, Vol.LXII, No. 1605, 29th Sept.1917, p.132.

Earwigs are collected in a pail containing water and paraffin.

268
1916. Caesar, L.

Leaf rollers attacking apples.

46th Ann.Rept.Entom.Soc.Ontario,1915,pp.163-178.

Miscible oils, sprayed just as the leaf buds are almost ready to burst are recommended for the leaf roller eggs.

269
1916. Caesar, L.

Notes on the season's spraying.

47th Ann.Rept.Fruit Growers' Assoc.,Ontario, 1915, p. 67.

Scalecide gave good results on the San Jose scale.

270
1916. Caesar, L.

The fruit-tree leaf roller.

Canadian Hort., Vol. XXXIX, No.2, pp.21-22.

Scalecide 1-15 gives the best results against this pest.

271
1918. Caesar, L.

The fruit-tree leaf-roller.

Canadian Ent., Vol.50, No.10, pp.321-323.

Spraying with scalecide or other good miscible oil a few days before the buds burst will kill all the leaf roller eggs it covers.

272
1918. Cameron, A.E.

Some blood sucking flies of Saskatchewan.

Agric.Gaz. Canada, Vol.V, No.6, pp.556-561.

The judicious application of kerosene, crude oils of paraffin and asphaltum bases will provide a surface film which kills the larvae of mosquitoes.

273
1922. Cameron, A. E.

The morphology and biology of a Canadian cattle infesting black fly, Simulium simile, Mall.
Canada Dept.Agric., Bul.N.S.No.5, pp.26.

Kerosene emulsion made by the R & H formula is a very good repellent for the flies when sprayed on the animals. This is diluted 1-5.

274
1916. Cameron, A.E. & Treheme, R.C.

The pear thrips in British Columbia and its control.
Agric.Gaz.Canada, Vol.III, No.11. pp.9[illegible]-951.

Miscible oil No. 2, 5 gals. B.L.40, 1 pt., water 200 gals. was used for pear thrips. A slight browning of the foliage resulted from its use.

275
1917. Cameron, A.E. & [illegible]

Work of combating the pear thrips in the Saanich Peninsula.
Agric.Jl.of B.C., vol.I, No.12, p.[illegible].
Miscible oil appears to be more effective in penetrating the opening buds early in the spring and reaching the thrips therein, than whale oil soap and nicotine. There is much uncertainty as to its effect on the trees.

276
1917. Cameron, A. E., Treheme, R. C.& Hadwen, S.

Doing away with the mosquito pest.

Agric. Jl. Dept.Agric., Victoria, B.C., Vol. II, No.3, p.56.

Oil treatment is only temporary.

277
1919. Cammñas, M.

Report of the Commissioner of Agriculture and Labor.
19th Ann.Rept.Gov.Porto Rico to Secy.War, Washington, D.C., 1919, Appendix IX, pp.685-707.
One application of paraffin oil emulsion spray was not effective for scale insects on citrus trees. Mealy bugs were but little affected by the spray.

278
1915. Campbell, J. A.

Insect pests of the orchard.

Jour.Dept.Agric.N.Zealand, Vol.10, No.5, p.473.

Oil emulsion should be used for red mites 1-15 on Pip fruits and 1-17 on stone fruits. 1-15 dilution should be used on mealy bugs. For San Jose scale oil applied as for red mites; also for mussel scale and woolly aphis.

279
1915. Campbell, J. A.

The orchard.

Jour.Dept.Agric.N.Zealand, Vol.XI, No.1, pp. 61-2.
This article is the same as one abstracted for Campbell in this Jour.Vol.10, No.5, p.493, 1915.

280
1916. Campbell, J. A.

The orchard.

Jour.Dept.Agric.New Zealand, Vol.12, No.4, p.309-313.
Emulsified oil is the best remedy for San Jose scale, and woolly aphis.

281
1917 - Campbell, J. A.

Work for the coming month.

The Orchard

Jl. Agri. Wellington, N. Z., Vol.XIV, No.4 pp 308-311

Emulsified oil is the most reliable spray for San Jose scale but cannot be applied to peaches.

282
1918. Campbell, J. A.

The orchard.

Jour.Dept.Agric.New Zealand, Vol.17, No.1, p. 45-7.

Oil emulsion diluted 1-8 to 1-12 for red mite, mussel scale, San Jose scale, woolly aphis and mealy bug on pip fruits. On stone fruits dilutions of 1 12 to 1-20 should be used for the same insects.

283
1921. Campbell, J. A. & Taylor, W. H.

Lemon culture.

N. Zealand Jour.of Agric., Vol.23, No.6, p.330-335.

Citrus scale when young can be destroyed by using a red oil emulsion 1-40.

284
1926 Canals, E. and Mousseron, M.

Stability of gum emulsions in oil. Bull. sci. pharmacol. 33, 283-8. C.A. 20, 2723.

285
1918. Capus, J.

La cochenille de la Vigne.

Jour.d'Agric.Prat.Vol.82, T.31, p.444.

The following wash is used for the scale on the grape: Heavy oil, 5 to 10 kilog; quick lime 20 kilog; water 100 liters. The lime is slaked in 30 liters of water, then the rest of the water added before the oil is added. The mixture is applied with a brush.

286
1897. Card, F. W.

Notes on the Codling Moth.

Garden & Forest, Vol.10, No.493, Aug.4, 1897, pp.302-303.

Kerosene emulsion will kill the codling moth in the laboratory.

287
1897 - Card, Fred W.

Observations on the Codling Moth.

~~Bul.~~ Nebraska Agr. Expt.Sta. Bul. No. 51, pp. 11-50.

The results from spraying with kerosene emulsion for codling moth were not as good as they would have been had the trees been sprayed earlier. The spraying was done on June 14. The emulsion only affects the eggs and young largae, but many of the eggs had hatched before that date.

288
1901 - Card, F. W. and Adams, G. E.

San Jose Scale.

Rhode Island Sta.Rpt. 1901, pp. 241-244.

Kerosene was applied as a mechanical mixture with a kerowater pump to apple trees in the fall. The amount of kerosene put on was not definitely known due to the unreliability of the indicator on the pump. The same difficulty was experienced when crude petroleum was applied in the spring. The autumn treatment with kerosene was better than the treatment with whale oil soap. Crude petroleum treatments were far better than the kerosene or soap treatments. No injury could be traced to the petroleum.

289
1904. Card, F. W. & Stene, A. E.

Gasoline as a remedy against enemies of the squash, cucumber, and pumpkin.

Rhode Island Agr.Expt.Sta.Rpt.1903, p.216.

Gasoline proved wholly ineffective against the insects on squash, cucumber, and pumpkin.

290
1907. Carey, C. A.

Texas or tick fever.

Alabama Agr.Expt.Sta.Bul.141, pp.109-186.

Kerosene emulsion 20 to 25% or kerosene oil 20-25% in combination with cotton seed oil or lard have been used. The oils may be applied with a brush, swabs or hand clothes. Oil has some striking advantages. It destroys ticks, it stays on the hair and skin for several days, it also keeps off flies.

291
1913. Cary, C.A.

Dipping vats and dips.

Alabama Agr. ~~Expt. Sta.~~ Coll. Expt. Sta. Bull. 171, pp. 97-110.

Use crude petroleum (Beaumont oil or Gulf Refining Oil - Do not use the thick black oil as it will not emulsify). Dissolve 1 lb. hard soap in 1 gal. hotsoft water, add 1 gal oil and stir vigorously. When thoroughly emulsified add 2 gals. hot water. This makes a 25% emulsion. An 80% emulsion is made by dissolving 1 lb. hard soap in 1 gal. hot water; then adding 4 gals. oil and stir vigorously. Take 1 part stock to 2-1/5 parts warm water for 25% solution. A 25% emulsion will kill all ticks except the large ones which must be picked off.

292
1915. Carey, C. A.

Dipping vat for hogs and dips, hog worms, lice and mange, hog lots, houses and water supply.

Ala.Agr.Expt.Sta.Bul.185, pp.35-58.

Kerosene or crude oil emulsion makes an excellent dip for lice on hogs, calves, colts and goats. The following formula is given: 1 lb.soap dissolved in 1 gal. of hot water, 1 gal. of oil is then added and emulsified. 3 gals.of warm water are added before using.

293
1902 - Cary L. R.

The Grass Thrips.

Maine Agr. Expt. Sta. Bul. 83; pp. 95-128.

As the thrips feed by sucking the juices of the plants, contact poisons, such as kerosene emulsion or whale oil soap, are the only ones which are of use in combating it.

294
1914. Carneiro, Manuel.

Consultorio avicola pó insecticida.

Chacaras e Quintaes Vol.10, No.6, pp.414-415.

A strong soap solution containing 5% kerosene and enough crude carbolic acid to darken the liquid is painted in cracks and on roosts in chicken houses for poultry lice. A mixture of 1 teaspoon pork fat, 1 teaspoon kerosene and a few drops of carbolic acid is applied directly to fowls. A dusting powder for lice on fowls is made of plaster of Paris 2 kg., cresol 200 gms., gasolene 0.5 liter; a mixture of ashes saturated with kerosene is scattered about the floor of hen houses. A spray of 30 gms. carbolic acid in 400 gms. kerosene is recommended for lice & mites of poultry.

295
1901. Carpenter, G. H.

The diamond back moth.

Jour.Dept.Agr.& Tech.Instr.Ireland, Vol.2, No.2, pp.275-279.

The larvae can be destroyed by soft-soap and paraffin mixture. 5 lbs. soap and 5 pts. kerosene (paraffin) to 100 gals. water.

1906 - Carpenter, G. H.
296

Injurious insects and other animals observed in Ireland during the year 1905

Econ. Proc. Roy. Dublin Soc., Vol. 1, No. 8, pp 321-344

Spraying the cabbage aphid with paraffin (kerosene) and soap emulsion is practicable in garden plots, but is not profitable on large fields.

297
1908. Carpenter, G. H.

Some Irish experiments on warble flies.

Irish Nat., Vol.17, No.11, p. 245.

Kerosene emulsion is useless in preventing egg laying.

1910 - Carpenter, G.H. & Corson, T. H.
298

The warble flies

Dept. Agr. and Tech. Instr. Ireland, Jour. Vol. 10, NO. 4, pp 242-550

The warble maggots were killed by the use of a dressing of archangel tar and paraffin oil in equal proportions.

299
1893. Carpenter, S. B.

Kerosene Emulsion.

Proc.17th Ann.Meeting,Ga.Hort.Soc.for 1892, pp.34-35.

The R & H formula for kerosene emulsion is discussed.

300
Cassidy, James.
1889.

Notes on Insects and Insecticides.

Colorado Agr. Expt. Sta. Bul. 6, 24. p.

Kerosene is one of the most effective remedies against all insect life not affected by the arsenical poisons, causing death by suffocation or by its corrosive action. Its cheapness places it within easy reach. The Riley formula is given. Dilute 1-9 with H_2O.

301
1913. Castellani & Chalmers.

Parasitic causes of diseases.

Manuel of Trop. Medicine. 1747 pp. Bailliere, Tindall and Cox, London, p. 633.

Kerosene oil is recommended as a treatment for Pediculus humanus.

302
1915. Castellani, A. & Jackson, T. W.

Notes on certain insecticides.

Jl.Trop.Med.Hyg.,Vol.XVIII,No.22,pp.253-254.

Kerosene was the best substance used for lice. It practically kills body lice instantaneously. While used for destroying lice and other vermin in houses, furniture, etc., it was not extensively used on the skins of affected people owing to its disagreeable odor. Gasoline is quite as effective as kerosene.

303
1895. Caudell, A. N.

Insecticides.
Oklahoma Agr.Expt.Sta.Bul.15,pp.29-30.
Kerosene emulsion with 5 grams of pyrethrum powder to each gallon of emulsion was used on squashes, cucumbers and melons. The emulsion was diluted to 3 times its bulk with water, This killed all the plants. Only the very young squash bugs were killed.

304
1914. Celli,A.

La Malaria in Italia durante il 1912. (Malaria in Italy during the year 1912).
Ann.Igiene Sperimt., Torino,vol.XXIV,pt.2,pp. 177-244.
Crude or heavy oils are better than kerosene for the destruction of mosquito larvae because they are cheaper and slower in evaporating. They are less even in distribution on water, leaving spaces on the water surface that are not covered with an oil film.

305
1921. Chaffin, J.

Mealy-bugs.

Qtrly.Bull.Florida State Pl.Bd.,Vol.V,No.3, pp.154-158.
Where a barrel sprayer is employed it is best to use an oil spray about 1/4 or 1/3 stronger than is recommended for white fly and common scale insect pests.

306
1895 - Chambliss, Chas. E.
Insecticides.
Tenn. Agr. Expt.Sta.Bul. Vol. VIII, no.1, PP.14-17.

The R & H formula for making kerosene emulsion is given. Also the kerosene and milk formula. The former can be made up without heating and must be used immediately. Kerosene and water mechanical mixture may be used as an insecticide.

307
1895 - Chambliss, Chas. E.,
The Chinch Bug.
Tennessee Agr. Expt. Sta.Bul. Vol. VIII, #4. pp. 41-55.

Kerosene emulsion made by the R & H formula was the best insecticide used on the chinch bug. A dilution of 1-15 would not injure the youngest corn and was sure death to the bugs. A mechanical mixture of kerosene and water (1-14) killed the bugs without injury to the plants. This method was not generally used because of the difficulty of keeping water and kerosene mixed in the proper proportions.

308
1912 - Chandler, W. H.
Combatting orchard and garden enemies.
Missouri Agric. Expt. Sta . Bul. 102, pp. 237-290.
Kerosene emulsion is the most important summer contact spray. Dissolve ½ lb. hard soap in 1 gal. boiling water (soft) adding 2 gals. of kerosene as soon as all the soap is dissolved. Mix by pumping back into itself with a spray pump for 10 minutes. For use, mix this ~~mixt~~ with 17 gals. water. This is a 10% emulsion especially valuable in fighting plant lice and other soft bodied insects which suck the juices of plants. ~~Other~~ Sprays for other sucking insects are the miscible oils. These are oils so treated that they mix readily with water, generally giving a white emulsion. Some of the widely known miscible oils are. Scalecide, Target brand scale destroyer, San-U-Zay, etc.

309
1925. Chandler, S.C. [illegible] E.A.

[illegible]

Jour. Econ. Ent. vol. 18, no. 3, [illegible] 557-[illegible].
The Temp. following application must be considered [illegible] scoring. 3-11 weeks may be necessary if cold weather retards [illegible] [illegible] [illegible] ther [illegible]

310
1907 - Chase, W. W.

The use of Soluble Oils Against San Jose scale.
Ga. Sta. Bd. Ent. Circ. 6, 11 pp.

The results of spraying orchards with scalecide and Target brand are given. There seemed to be little choice between the brands and they are recommended under the following conditions: That they be used at no greater dilution than 1-12. That the spray be applied as soon after the leaves drop as possible . Better results have been obtained by spraying in the fall. That care be exercised in selecting the proper spraying equipment. That all trees badly infested with scale be sprayed twice once in the fall and again in the spring.

311
1916 - Chase W. W.

The Principal Parasites of the Peach.
Georgia State Bd. Ent. Bul. 43, pp. 1-39.

The soluble oil preparations are highly effective and dependable for the Terrapin scale, Scalecide is among the best. This material is a mixture of vegetable and mineral oils with naphthalene. Applied in the spring just before buds open at 1-15 it will destroy over 90% of the infestation. Oil sprays are not recommended for peach. The possibility of injury to peach trees is minimized in the spring application and its insecticidal value is greater.

312
1915. Childs, Leroy.

Spraying notes on the control of the fruit tree leaf-roller in the Hood River Valley.

Jour.Econ.Ent.Vol.VIII,No.5,p.457-466.

Miscible oil applications proved to be decidedly efficient as agents in killing leaf roller eggs.

313
Childs, L
1915. Entomological envestigation. Hood River Branch Experimant station for 1914-1915.
Oregon Agr. Coll. Expt. Sta. Report pp 47-61.

See Supplementary abstract

314
1917 - Chilas, L.
Further Observations on the Control of the fruit-tree leaf-roller in the Hood River Valley.
Report Hood River Branch Expt. Sta. for 1916,
Oregon Agric. Coll. Expt. Sta. Bul. 141, pp. 17-27.

See Supplementary abstract

315
1921 - Chilas, Leroy.
Amounts of spray required on trees of different ages in the different applications.
Third Crop Pest and Hortic. Rept. 1915-20; Oregon Agric. Coll. Expt. Sta., pp. 121-122.

Average spray requirements for best control on trees of different ages.

Age of trees	Misc.oil gal. per tree Spring appli.	Arsenate lead & lime sulphur Summer appli. scab & codling moth: gals per tree.	Fall Bordeaux gals. per tree
11	4.1	4.1	--
12	4.5	4.5	5.0
13	5.6	4.5	5.1
14	7.0	5.2	--
15	7.2	5.6	6.1
17	8.0	6.0	7.4

316
1920. Chipp, T. F.

A remedy for bean fly.

Gardens' Bull. Straits Settlements, Singapore, Vol.II, No. 7, pp.263-4.

The beans should be covered with a light layer of sawdust, which should then be wetted with kerosene emulsion. It should be made with 1 lb. ordinary soap dissolved in 2 gals. of boiling water; when dissolved, water should be added to make 4 gals. and 3/4 pt. of kerosene well stirred in.

317
1894. Chittenden, F. H.

Supplementary notes on the strawberry weevil, its habits, and remedies.

Insect Life, Vol.VII, No.1, pp.14-23.

Kerosene soap emulsion diluted 1-10 when sprayed showed considerable repellant action to the weevils.

317a
Chittenden, F.H.
1896. Insects affecting cereals and other dry vegetable foods. (In, Principal household insects of the United States, by Howard, L.O. and Marlatt, C.L.)
U.S.D.A. Bur. Ent. 4, n.s. pp 112-131.

On small ponds kerosene will kill all mosquito larva and eggs. Also many females as they are about to deposit their eggs. Liberal applications of benzine and kerosene will exterminate bed bugs. Spraying with kerosene emulsion will control the clover mite in houses.

318
1897. Chittenden, F. H.

Some insects injurious to stored grain.

U.S.D.A. Farmers' Bul.45, 24 pp.

Benzine and gasoline are of some value as fumigants for some materials but do not produce satisfactory results with grains.

319
1899. Chittenden, F. H.

Insects injurious to beans and peas.

U.S.D.A. Yearbook 1898, pp.233-260.

Kerosene emulsion gives good results when used as an under spray for the bean lady bird. Kerosene emulsion is also recommended for plant lice, leaf hoppers, and plant bugs.

320
1899 - Chittenden, F.H.
Some insects injurious to garden and orchard crops.

USDA Div. Ent. Bul. 19, n. ser. 99 pp.

Gypsum saturated with kerosene is a repellent for the common squash bug. Kerosene emulsion will kill the nymphs of the banded leaf-footed plant bug. Kerosene emulsion is used for the garden flea hopper.

321
1900 - Chittenden, F.H.
The destructive pea-louse.
USDA Div. Ent. Bul. 23, n.s. pp. 33-37.

Kerosene emulsion is recommended for the pea louse. (p.29) the Pale-striped Flea-beetle and (p.84) the Fall Army Worm.

322
---- Chittenden, F.H.
1901. Some insects injurious to the violet, rose and other ornamental plants.
USDA Div. of Ent. Bul. 27, n. ser. 114 pp.

Kerosene emulsion is valuable for the red spider but is too strong for some plants. Kerosene emulsion applied to the soil about the roots of affected plants will kill the larvae of the fickle midge.

323
1901 - Chittenden, F.H

The fall army webworm and variegated cutworm

USDA Div. of Ent. Bul. 29, n.s. 64. pp.

Lawns may be freed from the army worm by the application of kerosene emulsion followed by a copious drenching with water.

324
1901 - Chittenden, F.H.
The destructive green pea louse,
U.S.D.A. Bur. Ent. Circ. 43; (2nd ser.) 8 pp.

Kerosene emulsion diluted 1-12 is recommended.

325
1902. Chittenden, F.H.

Some insects injurious to vegetable crops.
U.S.D.A. Div. Ent. Bull. 33, (n.s.) 117 pp.
The beet army worm may be controlled by two sprayings with kerosene emulsion.

326
1902. Chittenden, F. H.

The destructive green pea louse.

U.S.D.A. Div. Ent. Circ. 43, 8 pp.

Kerosene-soap emulsion is a standard remedy when diluted 1-12.

327
1903 - Chittenden, F.H.
The fruit tree bark beetle.

U.S.D.A. Div. Ent. Circ. 29, 2 ser. 8 pp.

The beetles may be killed by touching the infested spots with a sponge saturated with kerosene.

1903 - Chittenden, F.H.
The striped cucumber beetle.
328 U.S.D.A. Bur. Ent. Circ. 31; 6 pp.

Land plaster or gypsum saturated with kerosene is distasteful to this insect.

329
1903. Chittenden, F. H.

A brief account of the principal insect enemies of the sugar beet.

U.S.D.A. Bur. Ent. Bul. 43, 71 pp.

Kerosene pans are used for catching young grasshoppers. The R & H kerosene emulsion is used for the melon louse.

330
1905 - Chittenden, F.H.
The imported cabbage worm.
U.S.D.A. Bur. Ent. Circ. 60; 8 pp.

Kerosene emulsion is not effective because it is necessary for the spray to come into direct contact with the larvae in order to kill them.

331 1906 - Chittenden, F. H.

Root maggots and how to control them.

U.S.D.A. Bur. Ent. Circ. 63; 2 ed. 7 pp.

Kerosene and sand acts as a repellent to the adult flies. This mixture will also kill young maggots attempting to crawl thru' it.

332
1906 - Chittenden, F.H.
Melon Aphis

U.S.D.A. Bur. Ent. Circ. 80; 16 pp.

The R & H formula for kerosene emulsion is given. It is diluted 1-6 or 8 for use against the melon aphis.

333
1908 - Chittenden, F.H.
The Harlequin cabbage bug.
U.S.D.A. Bur. Ent. Circ. 103; 10 pp.

10 % kerosene emulsion is effective in killing the nymphs but not effective against adults.

334
1909 - Chittenden F. H.
Some insects injurious to truck crops.
The hop flea beetle.

USDA Bur. Ent. Bull. 66, pt. 6, pp. 71-92.

Kerosene emulsion 1/4 lb; soap and 1 gal. kerosene to 25 gals. water while excellent for the hop louse will also kill all the beetles coming in contact with it.

335
1909 - Chittenden, F. H.
Some insects injurious to truck crops.
The parsnip leaf miner; the parsley stalk weevil; the celery caterpillar.

USDA Bur. Ent. Bul. 82; Pt. 22, pp. 9-24.

Sprays of kerosene emulsion and of carbolized kerosene emulsion are reported to be successful in the treatment of young plants affected by the celery leaf-miners. Kerosene emulsion applied about the roots of parsley will be effective against the parsley stalk weevil.

336
1909 - Chittenden, F.H.

The common red spider.
U.S.D.A. Bur. Ent. Circ. 104; 11 pp.

The R.& H. formula for kerosene emulsion is given. It should be diluted 1-10 for red spider.

337
1909 - Chittenden, F.H.
The Rose Chafer,
USDA. Bur. Ent. Circ. 11; 4 pp. (revised)

Kerosene is a failure against this insect.

338
1912. Chittenden, F. H. & Marsh, H. O.

The imported cabbage webworm.

U.S.D.A.Bur.Ent.Bul.109, pt.III, pp.23-45.

A mixture of kerosene oil and soap sprayed upon infested plants served as a deterrent against the larvae of this moth.

339
1918. Chittenden, F. H.

Control of the melon aphis.

U.S.Dept.Agric.Farmers'Bul. 914,16 pp.

The R & H formula for making kerosene emulsion is given.

340
1922. Chittenden, F.H. and Fink, D.E.

The green June beetle.

U.S.D.A. Bul. 891, 52 pp.

Kerosene emulsion made by the R. & H. formula is recommended for the grubs of the green June beetle. A 10% solution is usually sufficient if followed by a copious application of water in order that the insecticide may penetrate more deeply into the soil.

341
1924. Christie, G. I.

Dept. of Entomology.
37th Ann.Rept.Purdue Univ.Agr.Expt.Station, 1924, pp.23-26.

Excellent results were obtained with oil emulsion (boiled) on the San Jose scale. Oils emulsified with Bordeaux mixture, caseinate of lime and other materials by the cold process and lime sulphur, gave fairly good results but not as good as the oil emulsion. Oil emulsion as a summer spray on apple trees, may be used in an emergency.

342
1917. Christy, C.

Notes on malaria for officers and men.

Lancet, London, Vol.CXCIII, No.4909, 29th Sept.1917, pp.485-486.

The following lotion is used for keeping mosquito away: Citronella oil 1-1/2 parts; kerosene, oil, 1 part; coconut oil, 2 parts. To which is added carbolic acid 1%. Its efficacy is from 4 to 6 hrs.

343
1919. Chrystal, R. N.

The European elm sawfly leaf-miner.

Agric.Gaz.Canada, Vol.VI, No.8, pp.725-728.

Kerosene emulsion 1-7, was effective when used at the time the larval mines were just commencing.

344
1900 - Chrystal, R.N. & Story, F.

[illegible]

[illegible]

Only spraying of the nursery plants is practical. Paraffin emulsion may be used according to the following formula. Paraffin 2 pts; soft [illegible]

345
1890 - Churchhill, G.W.
Report of Acting Pomologist.
N.Y. State Agr.Expt.Sta. 8th Ann.Rpt. 1889, p 337-373

Kerosene emulsion proved successful in destroying the eggs of aphids and other insect pests, wherever it was possible to reach them with the spray. Kerosene can be used on many trees and plants without injury when they are in a dormant state.

346
[illegible]

[illegible]

See Supplementary abstract

347
1904. [illegible]

[illegible]

[illegible] Bul. 153, 13 p.

Kerosene emulsion was made by dissolving seven and one-half lbs. of ordinary laundry soap in 15 gls. of hot water to which is added 5 gals. kerosene oil. The soapy water and oil were thoroly churned together. The kerosene emulsion must not be kept too long before using, because of the tendency it has for separating and allowing free oil to appear. The spray material was made by taking 40 gals. of a tobacco decoction and adding to it 3½ gals. of the kerosene emulsion. A certain amount of separation of the oil was unavoidable. The free oil burned the hop foliage badly.

348
1907. Clarke, W. T.

Injurious insects and their control.

Ala.Agr.Expt.Sta.Bul.139, 20 pp.

The following formula is given for kerosene emulsion for use on plant lice, 1-1/2 lbs.laundry soap, 1-1/2 gals.water, 1 gal.kerosene. This is emulsified in the usual way, 18 gals. of water is added to this stock before using.

349
[illegible]

[illegible]
[illegible] Univ. Agric. Coll. Expt. Sta. [illegible]

Kerosene Emulsion formula: Kerosene (42° Baume) 20 gals; solid whale oil soap 5 lbs. or liquid whale oil soap 1 gal; water 200 gals. Results of this emulsion for mealybugs are not entirely satisfactory. There is lack of penetration in cases where large egg masses are present. Distillate emulsion: Distillate (32° Baume) 4 gals; liquid whale oil soap ½ gal. or solid soap 5 lbs., water 200 gals. This emulsion is less likely to do injury to the fruit and foliage in some sections. Kerosene lime mixture: Kerosene (42° Baume) 20 gals. unslaked lime 40 lbs., water 200 gals. The lime increases the penetration of the kerosene into the waxy covering of the mealybug.

350 Clayton, W.

1928

The theory of emulsions and emulsification, W. CLAYTON (*London: J. & A. Churchill, 1928, pp. VIII+160, pls. 4, figs. 18*).—This monograph, which contains a foreword by F. G. Donnan, deals with the theoretical aspects of emulsions and emulsification, with such references to technical applications as are necessary to illustrate some particular laboratory method on a large scale or some important theoretical point. The method of treatment, while historical to a certain extent, in general follows a logical line of development based upon modern physico-chemical principles. Literature references are given both as footnotes and in a very complete bibliography arranged in chronological sequence, with the papers for each year in alphabetical order of authors.

351
1925 Clayton, Wm.

The colloid chemistry of technical emulsions. Ind. Chemist. 1, 223-5.

352
1900 - Close, C.P.

Plant diseases and insect pests.
Utah agric. Coll. Expt.Sta. Bul. 65- p. 57-97.

The R & H formula for kerosene emulsion is given.

353
1904-Close, C.P.

Report of the Horticulturist. Delaware Coll. Agric. Expt. Sta. Rpt. 1903, pp. 117-140.

Pear, Apple, cherry and peach nursery stock were dipped in kerosene and crude petroleum to find what injury would result. Peach trees would be ruined by dipping. The cherry trees did not live. The apples seemed to be able to stand the dipping without serious injury. Crude oil seems to be safer on pears than kerosene.

354
1905 - Close, C. P.

The New K. L. Mixture and San Jose Scale.

Delaware Coll. Agr. Expt. Sta. Bul. 68, 23 pp.

See Supplementary abstract

355
1905. Close, C. P.

Limoid and kerosene.

Rural New Yorker, Vol.LXIV,No.2875, p.179.

See abst. of Delaware Agr.Expt.Bul. 68 of C.P. Close for this article.

356
1905. Close, C. P.

A New spraying mixture.
Rural New Yorker, Vol.LXIV,No.2908, p.757.
The formula for the new mixture is as follows: 5 gals.kerosene, 20 lbs.hydrated lime; 40 gals.water; 5 gals.sulphide of lime. The lime and kerosene are mixed together with some water. The remainder of the water is added and agitated vigorously. Then the sulphide of lime is added and agitated. 10 to 12-1/2 % is used for peaches, 15 to 17-1/2% for all other fruit after the middle of October; 15 to 20% on all fruit trees in the spring.

357
1906 - Close, C.P.

The K. L. emulsions and spraying.
Delaware Coll. Agr.Expt.Sta. Bul. 73, pp. 20.

See Supplementary abstract.

358
1906 Close, C.P.

Third Report on dust and liquid spraying.

Delaware Coll.Agr.Expt.Sta. Bul. 76, 19 pp.

A spray consisting of kerosene, lime, borxeaux and poison spray (K-L-B-P) was tested with other sprays and dusts. Either 12½% or 15% K-L-B-P properly made and thoroly applied will not only hold the scale in check, but reduce it in numbers and keep the fruit and leaves clean. An application once a month beginning June 1st as long as necessary will keep the scale under control. Using K-L-B-P. for the early spraying. The scab and scale can be handled at one time.

359
1907 - Close, C.P.

Dipping nursery stock in insecticides.

Delaware Coll.Agr. Expt.Sta.Rpts. 1904-1906, pp.48-69

See Supplementary abstract

360
19.. ....ll, T.D.A.

Some insect pests of Salt River Valley and the remedies for them.

Ariz. Agr. Expt. Sta. Bull. 32, pp. 273-...

See Supplementary abstract

361
1911. Cockayne, A. H.

An insect injurious to spruce trees.
Jour.Dept.Agric.N.Zealand, Vol.2, No.3, p.117-120.
The best results have been secured with an oil spray applied during the dormant season, using an emulsion containing about 6% of either a lubricating or cylinder oil. The lubricating oils, especially those known as red machinery oils are very suitable.

362
1912. Cockayne, A.H.

A household pest.

Jour.Dept.Agric.New Zealand, Vol.4, No.4, p. 269-270.

Spraying with some of the lighter emulsified oils would prove satisfactory for the acarina, but such treatment is only applicable to certain types of out buildings.

363
1923. Cockerham, K. L.

A manual for spraying.

The Macmillan Co.N.Y., 87 pp.

The following oil emulsion formula is given: Paraffin oil, 2 gals.; water (soft), 1 gal; caustic potash fish oil soap, 2 lbs; ground flue 1 lb.; carbolic acid (50%) 2 to 4 ozs. All of the material except the carbolic acid is put in a boiler and heated to boiling. It is emulsified by means of a pump. The R & H formula for kerosene emulsion is given.

364
1894. Collier, P.

Some insects injurious to squash melon and cucumber vines.

N.Y.(Geneva)Agr.Expt.Sta.Bul.75 (n.s.), pp. 407-425.

The R & H formula was used diluted 1-4 on the squash bug. This strength killed the bugs and also injured the vines. A weaker dilution 1-6 killed the young bugs only.

365
1894. Collier, P.

Pt.III Insecticides.

N.Y.(Geneva)Agr.Expt.Sta.Bul.83 (n.s.), pp. 686-688.

The R & H formula is given, and also the sour milk formula.

366
1906. Collinge, W. E.

A winter spraying of fruit trees.
Univ.Birmingham, Dept.Econ.Zool.Circ.2, 2 pp.
The following formula was used for spring spraying: 1/2 lb. of soft soap was dissolved in 1 gal. boiling water and 5 pts. of kerosene were added. This was emulsified by using a force pump. 2 lbs. of caustic soda (98%) were dissolved in 9 gals. of rain water and the solution poured into the kerosene emulsion and the two mixed together. This spray destroyed the eggs of the apple sucker, mussel scale and plum aphis.

1907 - Compere, G.
367

Kerosene remedy and the fruit fly.
Jour. Dept. Agr. West Aust., Vol.15 No.4, p. 244-245

Kerosene was found to be an attractant for fruit flies.

368
1916. Compere, H.

Notes on the tomato psylla.

Mthly.Bull.Cal.State Commiss.Hortic., Sacramento, Vol.V,No.5, pp.189-191.

On hardy resistant plants kerosene emulsion may be used. The R & H formula for making the emulsion is advised. The stock emulsion should be diluted 1 - 20.

369
1924 Compton, C.C.

The use of lubricating oil on greenhouse scale insects. Jour. Econ. Ent. vol. 17, No.2, pp. [illegible].

Formula: Oil(sp.gr. 0.886, vis. 365.3, volatility 4.9%) 1 gal; water 1/4 gal; K-fish oil soap [illegible] lbs. Concentration of spray 1% oil. [illegible] 90-100%. It is used against scale on palms and rubber plants without foliage injury, but severely injures Boston ferns 2% oil has been used without injury but is not recommended.

370
1880. [illegible], J. H.

Cotton insects.

Ann.Rept.of the Ento[illegible] for [illegible]
18[illegible]. Ann.Rept.of the Com[illegible]
[illegible] 347.

All efforts to use kerose[illegible] worms f[illegible]led because [illegible] ~~sufficient~~ and [illegible] sufficient to kill the worms als[illegible]

371
1881. Comstock, J.H.

Report on scale insects.

Ann.Rept.of the Ento[illegible] for the ye[illegible]
1880. Ann.Rept.of U.S.Commissioner o[illegible] Agric[illegible] for 1880, pp.276-291.

Kerosene used pure and dil[illegible] with water [illegible]ncert in results. Emulsion of kero[illegible] sour milk were tested for [illegible]tility.

372
1891 - Comstock, J. H. & Slingerland, M.V.
Wireworms.
N.Y. Cornell Univ.Agr.Expt.Sta.Bul. 33; p. 193-272.

Kerosene oil is not effective against wire worms. A strength sufficient to kill the wireworms will kill the vegetation. Kerosene emulsion made by the R. & H formula is a little more effective than the pure kerosene. Neither can be relied upon to destroy the wireworms. Experiments with crude petroleum and crude petroleum emulsion were not as good as those with the kerosene emulsion.

373
1922. Connor, M. E.

Final report on the control of yellow fever, in Merida, Yucatan, Mexico.

Amer.Jl.Trop.Med.,Vol.II,No.6,pp.487-496.

Gas oil or kerosene was used on the water kept for washing whenever larvae were found therein.

374
[illegible]

Notes on the length of time Aedes calopus larvae should be exposed to a film of kerosene.

Jour. Econ. Ent. vol.16, no. 4, pp. 380-385.
See typed abstract.

See Supplementary abstract.

375
1906. Conradi, A. F.

The San Jose scale.

Texas Agr.Expt.Sta.Bul.87,11 pp.

The following remedies were recommended as taken from the U.S.D.A. Bulletins, Kerosene, crude oil, kerosene water mixture, and petroleum emulsions, K-L mixture was used in an experiment but with variable results.

376
188[illegible]. [illegible] A. J.

Insecticides.

22nd Ann. Rpt.Secr. State Board Agr.Mich.1882 3, p.243-5.

For plant lice kerosene has given good results. A strong solution of soft soap is made and while hot kerosene oil in the proportions of 1 to 8 or 10 of suds. Sour milk may also be used for making kerosene emulsion.

377
1886. Cook, A. J.

Four important insecticides.

25th Ann.Rept.Secr.St[illegible]
1885-6. p.133-9.

The Cook formula for making kerosene emulsion is given.

378
1887 - Cook, A. J.
Plant lice and the codling moth.
Mich. Agr. Coll. Bul. 26, 6 pp.

To make kerosene emulsion use $\frac{1}{4}$ lb. hard soap preferably whale oil soap and 1 quart water or 1 qt. of com on soft soap and 1 qt. water. This is heated until soap is dissolved, when 1 pt. of kerosene is added and the whole agitated until a permanent emulsion is formed. Water is then added so that the kerosene is in proportion of 1-15. A mixture 1-8 on plant lice eggs is efficient. It was also effective on lice on fruit trees.

379
1890 - Cook, A. J.
Report of the Zoologist.
129
29th Ann. Rept. Mich.State Bd. Agr. for 1890+pp. 102-

1-15 Kerosene emulsion was used on currant sawfly eggs with no injury to foliage and no very serious damage to the eggs. A 10% emulsion was tried with slight injury to the foliage and was very destructive to the eggs. On cherry or pear slug, kerosene emulsion was used, 1-18, 1-15, 1-10, 1-6 and 1-5. The first three killed very few of the insects. The 1-6 and 1-5 killed nearly all the slugs and did [illegible] perceptible injury to the foliage. Kerosene emulsion was tried on a green bug on hollyhocks. This was a partial remedy. 1-8 dilution kills the bugs, but unless applied in a very fine spray it also injures the plants.

380
1890 - Cook, A. J.
INSECTICIDES.
Mich. Agr.Coll. Expt. Sta.Bul. 58, 12.pp.

The great value of kerosene and soap mixture, rests in the fact that it kills by contact. Cook found that [illegible] with soap solutions in [illegible] kill insects if it [illegible] would kill insects like [illegible], lice and scale [illegible]. It was first recommended to the public in 18[illegible]. In 18[illegible] Dr. C. V.Riley recommended the kerosene and milk emulsion. This was tried in 18[illegible], together with kerosene and soap mixture, and found that while it was no easier to mix, it was more injurious to the foliage, than the mixture he had been using for three years. The kerosene and soap emulsion was prepared as follows: mixed 1 qt. soft soap or $\frac{1}{4}$ lb. hard soap with 1 or 2 qts. of boiling water; as soon as the soap was dissolved, and while still hot, stirred in 1 pint of kerosene oil. This was violently stirred till it was permanently mixed - that is, till upon standing the oil did not rise to the top but remained incorporated with the liquid. This stirring is best done with a force pump, pumping back into the vesel containing the liquid. When ready to use stir in enough water to make 15 pints in all. This dilution will not injure foliage and will effectively destroy suctorial insects like plant lice.

381
1891. Cook, A. J.

Some historical notes.

Insect Life,Vol.4,Nos.1 & 2, p.62-3.

Kerosene and soap mixture was first used successfully in 1877.

1891. Cook, A. J.

Report of the Zoologist.

Mich. Agr.Expt. Sta.Report for 1891, pp.123-144.

Lace wing bugs were easily killed with kerosene emulsion.

382 a

1891 - Cook, A.J. & Davis, G. C.

Kerosene Emulsion, Some New Insects.
Mich. State Agric.Coll.Expt.Sta. Bul. 73, 16 pp.

See Supplementary abstract

382 b

1891 - Cook, A. J. & Davis, G. C.

Kerosene emulsion and notes on insects.
Mich. State Agr.Coll.Expt.Sta.Bul. 76, 16. pp.

See Supplementary abstract

383

1904. Cook, J. C.

Crude oil for the peach borer.

Pacific Rural Press, Vol.LXVII, No.10, p.158, March 5, 1904.

A thick or asphaltum base oil was very satisfactory in killing the young of the peach borer. 3 to 5% of crude oil mixed with whitewash is one of the most efficient preventives to the deposit of eggs by the moths.

384

1905. Cook, M. T.

The coffee leaf-miner.

U.S.D.A.Bur.Ent.Bul.52, pp.97-99.

Kerosene emulsion made with 1 part of kerosene, 1 part whale oil soap and 8 parts water was sprayed for the pupae. A slight burning of the leaves was noted. The treatment was fairly effective.

385

1914. Cook, F.C., Hutchison,R.H. & Scales, F.M.

Experiments in the destruction of fly larvae in horse manure.

U.S.D.A. Bul. 118, 26 pp.

Kerosene emulsion, prepared by the R & H formula was used in strength varying from 1 - 5 to 1 - 50. In no case were results obtained ~~which~~ ~~with~~ any appreciable larvicidal action.
which indicated

386

1923. Cook, F.C. & McIndoo, N.E.

Chemical, physical and insecticidal properties of arsenicals.
U.S.D.A. Dept. Bull.1147, 57 pp.
Tests were made with kerosene emulsion combined with acid lead arsenate and calcium arsenate to determine whether detectable changes took place in these mixtures. The kerosene emulsion was made by the R & H formula. Mixtures of these were made up and agitated for periods of 1 hr., 1 day, and 3 days. They were filtered and the filtrates were tested for arsenic. The

acid lead arsenate was combined with kerosene emulsion than when calcium arsenate was combined with it. It was evident that the lead and calcium of the arsenates combined with the fatty acids to produce soaps, leaving the corresponding amounts of arsenic in a soluble condition. Both mixtures are chemically incompatible.

387

1905. Cook, Melville Thurston & Horne, William Titus.

Coffee leaf miner and other coffee pests.
Estacion Central Agron.de Cuba,Bul.3,22 pp.
The larvae and pupae within the leaves are controlled by spraying with kerosene emulsion (1 part kerosene, 1 part whale-oil soap, 8 parts water mixed by pumping). At this dilution a slight but unimportant amount of burning of the leaves occurs.

388

1896 - Cooley, R.A.

Some Injurious Insects.
Mass.Agr. Coll. Hatch Expt.Sta. Bul. 36, 20 pp.

Kerosene emulsion diluted 4 times is recommended for the imported elm leaf beetle. The usual manner of making is given using ½ lb. bar soap, boiling water 2 qts., 4 qts, kerosene. Good results were obtained in the use of kerosene emulsion for San Jose scale.

389

1898. Cooley, R. A.

Notes on some Massachusetts coccidae.

U.S.D.A.Div.Ent.Bul.17,n.s.,p.61-65.

The maple leaf louse was treated with 3 lbs. whale oil soap dissolved in 3 gal.hot water and to this solution was added 1 gal. kerosene. This mixture was churned till an emulsion was formed, then 2 drams of crude carbolic acid was added. No live lice could be found.

390

1900 - Cooley, R.A.

Injurious fruit insects; insecticides, insecticide apparatus.
Montana Agr.Expt.Sta. Bul. 23, pp. 64-114.

Pure kerosene is fatal to almost all insects. It is extremely penetrating and enters the breathing pores of the insects and causes their death. Pure keorsene is more or less injurious to plant life and has to be diluted in some way. Soap is used to make it mix readily with water. A good formula for making kerosene emulsion is: dissolve ½ lb. ordinary bar soap in 1 gal. boiling water, 2 gals. of kerosene is poured into the water and soap mixture and vigorously churned for 4 or 5 minutes with a force pump. This should be diluted before using.

391

1910. Cooley, R. A.

Notes on spraying experiments for the oyster shell scale in Montana.

Jour.Econ.Ent.Vol.III,No.1,pp.57-64.

Undiluted kerosene loosened a considerable number of scales which fell to the ground, but the eggs under these scales were not prevented from hatching. The trees were late in putting out foliage and were injured.

392

1919 - Cooley, R.A.

17th Ann. Rept. of State Entomologist of Mont.
Mont. Agric.Expt.Sta. Bull. 133.

The leaf-roller of the apple can be controlled by the use of miscible oils as a spray in the spring as soon as the weather warms sufficiently for spraying .

393

1921 -Cooley, R.A.

18th Ann. Rept. of the State Entomologist of Montana; Montana Agric, Expt. Sta. Bozeman, Bull. 139, (Jany. 1921) 16pp

Miscible oil applied before the buds have started is advised.

394

1921 - Cooley, R. A.

Department of Entomology; 27th Ann. Rept. Mont. Agr. Expt. Sta., pp. 27-29.

Miscible oils were recommended for the fruit-tree roller in the bitter root valley. Preliminary experiments in which egg clusters were sprayed have given good results.

395

1922 - Cooley, R.A.

Experiences of the entomology department in insect control.
28th Ann. Rept. Montana Agr. Expt. Station; (1920-21) pp. 49-55.

The most effective control for the leaf roller is the application of a miscible oil against the egg stage. Only actual contact of the oil with the eggs will kill them. Tests showed that many miscible oils were not satisfactory. Dormoil was the ~~six~~ only oil that proved dependable. This miscible oil was used at the rate of 8 gals. to 92 gals. of water and is best applied with a spray gun giving a fine mist under high pressure. (275-300 lbs).

1923 - Cooley, R.A.

Department of Entomology.
29th Ann. Rept. Montana Agr. Expt. Sta.
1921-22, pp. 21-22.

"Various miscible oils were tested against the fruit-tree leaf roller and accurate observations made on the effects produced."

397
19[illegible]. Cooley, R. A. & Parker, R. R.

Cattle lice in Montana.

Rept. Montana Live Stock Sanitary Board and State Veter. Surgeon, 1915-1916, pp.19-21.

Kerosene and lard is a [illegible] hand applications on cattle in [illegible].

398
1887. Coquillett, D. W.

Report on remedies for the cottony cushion-scale.
Report of the Entomologist for the year 1886. Ann. Rept. of U.S. Dept. Agr. for 1886, pp. [illegible].

Kerosene emulsion was made by the R & H formula and used in dilutions varying from 1-6, to 1-18. These dilutions produced no injurious effects upon the trees. The [illegible].

399
1893 - Coquillett, D. W.
Report on some of the beneficial and injurious insects of California.

USDA Div. of Ent. Bul. 44; pp. 9-33.

Kerosene emulsion was not effective against the walnut span worm.

400
1924. Corbett, G. H. & Yusope, M.

Scatinophara coarctata, F. (the Black Bug of Padi).

Malayan Agric. Jl., Vol. XII, No. 4, pp. 91-106, Kuala Lumpur.

Kerosene emulsion has a marked killing effect on the various stages of S. coarctata but the quantity required would make the operation of spraying too costly.

401
1893 - Corbett, L.C.
Preparation and Application of insecticides.
S. Dakota Agr. Expt. Sta. Bul. 35; pp. 88-92.
The R & H and Cook formulas for making kerosene emulsion are given. Kerosene 2 gals., and sour milk 1 gal. are warmed to blood heat and mixed thoroly to give an emulsion. Before use this is diluted 10 times with water.

402
1900 - Corbett, L.C.
Spraying, Results of the season of 1900.
W. Va. Agr. Expt. Sta. Bul. 70; p. 353-82.

Neither pure kerosene, 25% kerosene or 20% crude petroleum injured the leaf or leaf buds when applied, the latter part of march. The origin of petroleum is given as outlined in Le Conte's Elements of Geology. Also the character and quality of W. Va. petroleum is given being taken from Vol 1 of the W. Va. Geological Survey, pp. 374-377.

403
1896 - Cordley, A.B.
Insecticides.

Oregon Agr. Expt. Sta. Bul. 41; pp. 102-108.

The R & H formula for making kerosene emulsion is given; an equally good emulsion may be made by using sour milk in the place of the soap and water in the R & H formula.

404
1897 - Cordley, A.B.
Insects of the prune.
Oregon Agr. Expt. Sta. Bul. 45; pp. 99-127.

The clover mite in all stages on prune trees may destroyed in summer by spraying with 1 part kerosene emulsion in 15 parts water. The same remedy is recommended for the red spider. Plant Lice are destroyed by spraying the under side of the leaves with kerosene emulsion 1-12 or 15. The spray should touch every insect. The box elder plant bug may be destroyed by spraying with strong kerosene emulsion.

1902. Cordley, A. B.

Dept. of Entomology.
14th Ann. Rept. Oregon Agr. Coll. & Expt. Sta. for 1902, pp. 59-67.

Crude petroleum was used on Italian prune for the leaf curl. At dilutions of 5 to 25% oil ~~without~~ injury to the foliage. The foliage was slightly darker green in color and more thrifty.

406
1921 - Cordley, A.B., & Jardine, J.T.
Dept. of Entomology, Ore. Agr. Coll. Expt. Sta. Rept. 1918-20; p. 59-63.

In 1919 oil sprays applied in April gave 50 to 90% control. In 1920 heavy oils gave better kill than light oils; late applications gave better kill than early. The nearer the hatching period the better was the control.

407
1915. Cory, E. N.

Preliminary report of the woolly aphis.

Jour. Econ. Ent. Vol. 8, No. 2, pp. 186-190.

Kerosene emulsion gave better results than any other insecticide.

408
1923. Cory, E.N.

The insects of 1922.

Rpt. of the Maryland Agr. Soc. Vol. VII, pp. 240-247.

The government formula for making oil emulsions is given. A 2% spray is recommended for the European red mite and San Jose scale.

409
1895. Cotes, E. C.

The tea insects of India.

Indian Museum Notes, Vol. 3, No. 4, 71 pp.

Kerosene emulsion made by the regular formula when diluted with from 9 to 50 parts of water is recommended for aphids, mites and scale insects on the tea plants.

410
1917. Cotton, R. T.

Scale insects and their control

Bd. Commiss. Agric. Rio Piedras Expt. Sta., P. R. Cir. 9, 7 pp.

Kerosene emulsion diluted 1-15 is very effective for scale insects and the pineapole mealy bug. For scale insects on citrus trees the most effective spray is the government formula for paraffin oil emulsion. This spray should be used at 1% strength carbolic acid added to stock emulsion 1 pt to 4 gals was effective against the ants that attend the scale.

411
1910. Cousins, H. H.

Practical measures for the prevention of ticks in Jamaica.
Bul. Dept. Agr. Jamaica, N. Ser., Vol. 1, No. 3, pp. 198-294.
The R & H formula for making kerosene emulsion with the use of 6 oz. of naphthalene given. This is used as a spray when diluted 1-4.

412
1906. Craig, C. E.

Patent washes for San Jose scale.

Va. crop pest Com. Circ. 2, n.s. 11 pp.

Scalecide was fairly effective when used at 1-4, 1-9 and 1-14, but weaker dilutions were not effective. There was no apparent injury to the trees. Target Brand Scale emulsion was not effective at the strength 1-20 as recommended by the company. Strengths of 1-10 or stronger of this material must be used.

413
1898. Craig, J.

Spraying.

Canada Expt. Farms Rpt. 1897, pp. 105-110.

Kerosene emulsion by the R & H formula was used on apple aphids. Injury to the foliage resulted from its use.

1919. Craighead, F.C.

Protection from the locust borer.
U.S.D.A.Bul.787, 12 pp.
The trees may be protected by using a spray made by dissolving 1/4 lb. of sodium arsenite or arsenate in 5 gals. water. To this add 1 qt. of miscible oil and agitate thoroughly. With kerosene emulsion, dissolve 1/4 lb. of the arsenical in 4 gals. of water and add 1 gal. of stock solution of kerosene emulsion and agitate thoroughly.

415
1922. Craighead, F.C.

Experiments with spray solutions for preventing insect injury to green logs.
U.S.D.A. Bul. 1079, 11 pp.
Creosote and kerosene mixtures gave excellent results in preventing insects attacks on logs. These mixtures also acted as repellents. Crude petroleum when used as a spray or dip was not effective. Anthracene oil emulsion was not effective. Kerosene also was not effective. Sixteen parts of 1% sodium arsenate and 1 part of a commercial miscible oil was

effective when Juniper was dipped but dipped Pine was heavily infested in 15 days. One part crude pyridin to ten parts kerosene was effective when pine and ash were dipped.

416
1894. Craw, Alexander,

Insect pests and remedies.

Calif. State Bd.Hort.Bull.67, 25 pp.

The R & H formula for kerosene emulsion is given.

417
1897. Craw, A.

Fruit tree borers.

Calif.fruit grower, Vol.20, No.1, p.4.

Kerosene emulsion should be injected into the burrows of the flat headed apple tree borer with an oiler or syringe.

418
1910. Craw, Alexander.

Insect pests and remedies.

Calif.State Bd.Hort.Bull.71, 32 pp.

The R & H formula for kerosene emulsion for black scale on olive trees is given. The following distillate emulsion formula is given: Distillate 28° (untreated) 5 gals; hot water, 5 gals; whale oil soap, 1-1/2 lbs. This is made in the same manner as the R & H kerosene emulsion.

419
1914 - Crosby, C.R.& Leonard M.D.
The tarnished plant-bug, Lygus pratensis Linn
N.Y. Cornell Univ. Agric. Expt. Sta. Bul. 346, pp. 463-525.
Kerosene emulsion can not be used for the control of the tarnished plant bug.

420
1917. Cross, H. E.

Experiments with emulsions for protecting camels against the attacks of blood sucking flies.

Agric.Research Inst. Pusa, Bull 76, 11 pp.

Kerosene emulsion was not effective against the blood sucking flies on camels. The emulsion was prepared by dissolving 1 lb. soap in 1 gal. of water and adding 20 ozs. kerosene, stirring briskly all the time. The following formula was also tried without success: Kerosene oil, 1 gal.; powdered naphthaline, 4 oz., soap 1 lb., water, 4 gals.

[illegible] Currant

Gardners' Monthly Vol.VIII, N.S, No.2, [illegible]. 1875, p 45-60

In 1870 kerosene was used with whale oil [illegible], increasing the [illegible] until it would kill the currant worm and not injure the foliage. The following formula resulted, 5 lbs whale oil soap, 1 wine qt of kerosene, 25 gals soft soap water. The soap and kerosene were mixed together; then 2 gals boiling water were added and then the remainder to the water, cold.

422
1925- Cutright, Clifford R.
Subterranean aphids of Ohio.
Ohio Agr. Expt. Sta. Bul. 387, pp. 173-238.

See Supplementary abstract

1921 - Dallas, W. K.
423
Control of red mite on fruit trees: Further tests at Papanui Experimental Orchard.

New Zealand Jl. Agric. Vol. XXII, No. 3, pp 171-174

Gargoyle red oil-1-60, plus 2-1/2 lbs soap was more effective than Federation oil, 1-80, plus 2-1/2 lbs soap. Gargoyle heated to 120°F (dormant spray) was very effective.

1917 - Darwent, H. J.
424
Citrus Culture

Jl. Dept. Agric. S. Australia, Vol. XX, No.12, pp 1009-1012

Oil emulsion has been used on red scale of orange with success. Red oil emulsion is very effective on black scale.

425
1926 Davey, W.P.

Making and breaking emulsions

4th. Colloid Symposium 1926 pp. 38-43.

426
1914. Davidson, W. M.

Walnut aphids in California,

U.S.D.A.Bul.100, 48 pps.

The most desirable combination for spring and summer spraying for control of the walnut aphids is a 2% distillate oil emulsion combined with tobacco extract 1-1500. No foliage injury resulted from its use.

427
1917. Davidson, W. M.

The pear woolly aphis.

Mthly.Bull.Cal.State Commiss.Hortic., Vol.VI, No. 10, pp.390-396.

Miscible oil, kerosene emulsion and distillate oil emulsion were used at proper strength with success in controlling aphis on the roots of young orchard trees

428
1924. Davidson, W.M.

Results of experiments with miscellaneous substances against the chicken mite.
U.S.D.A. Bul.1228, 10 pp.
Tests were made with three types of oil preparations. (1) Straight oils, (2) Mechanical mixtures of two oils or solutions of another type of substance (e.g.Naphthalene) in an oil, and (3) oil emulsions. Preparation of the first type included kerosene and gasoline. Gasoline was of little value, while kerosene was moderately efficient. Paradichlorobenzene dissolved in kerosene and gasoline and naphthalene in

kerosene gave no better results than the oils themselves. Kerosene emulsion was efficient when diluted 1 to 3 parts water. Heavy mineral oils with high boiling points were efficient when used at dilutions of 1 to 2.5 and 1 to 3 parts water.

429
1900. Davis, G.

Petroleum treatment for San Jose scale.
Amer. Agriculturalist, Vol.66, No.20, 17 Nov. 1900, p.483.

Putting pure petroleum on trees with a brush is not recommended. The petroleum can be used undiluted only during the dormant period when applied with a spray pump.

430
1900. Davis, G.

Petroleum as an insecticide.
Rural New Yorker, Vol.59, No.2637, 14 August, 1900, p.542.

Crude petroleum when applied to trees with a brush is applied too thickly, and trees were killed in every orchard when the brushing method was used. Crude petroleum diluted with water causes the same injury as the undiluted oil because the water evaporates and leaves the pure oil on the trees.

431
1905. Davis, G.

Crude petroleum vs. San Jose scale.

Rural New Yorker, Vol.LXIV, No.2878, p.246.

Crude petroleum proved more injurious to peach trees than the scale.

432
1890. Davis, G. C.

Some new insecticides.

Ark. Agr. Expt. Sta. Univ. Bull. 15, 10 pp.

Kerosene extract of pyrethrum was made by using 2-1/2 lbs. of pyrethrum to 1-1/2 gals. of kerosene. This extract was emulsified by the R & H formula: 1 - 450 to 500 was effective in killing cotton worms.

433
1893. Davis, G. C.

Insects Injurious to celery.

Mich. Agr. Expt. Sta. Bul. 102, pp.23-52.

Kerosene emulsion was ineffective against the little negro bug. Kerosene emulsion will diminish the three lined thrips. The following formula is given: 2 quts. water, 1 qt. soft soap or 1/4 lb. hard soap, 1 pt. of kerosene. The emulsion was also used for the celery aphis; and the celery aphalaria.

434
1894. Davis, G. C.

Insect Control

Michigan State Bd. Agr. Rpt., 1894
pp 453-460

The following kerosene emulsion formula is given. 2 qts of water added to 1 qt of soft soap or 1/4 lb of hard soap and heated to boiling. One pt of kerosene is added and the whole emulsified thoroughly.

435
~~1896 - Davis, G. C.~~

Pest of the house and ornamental plants.

Mich. State Agr. Coll. Expt. Sta. Special Bul. 2.

For hardy ornamental plants out of doors and more hardy ones indoors kerosene emulsion may be used. The soft soap formula is made by heating 1 gal. of soft soap until it becomes liquid, add 2 qts. of kerosene and agitate for 3 to 5 minutes. This will need 4 times its bulk of water before using.
Hard soap formula: To 2 qts of water add ½ lb. of hard soap and heat to boiling. When soap is dissolved remove from fire and add 1 pt. of kerosene and proceed as in soft soap formula. This should be diluted with twice its bulk of water before using.

436
1920. Davis, J. J.

Miscellaneous soil insecticide tests.

Jour. Econ. Ent. Vol.13, No.1, p.136.

Kerosene emulsion gave appreciable results against soil-infesting grubs.

437
1920. Davis, J.J.

Miscellaneous soil insecticide tests.

Soil Science, Vol.X, No.1, pp.51-72.

Kerosene emulsion against grubs of Cotinis at 5 to 10% strength was found effective in destroying 80% of the grubs. A slight browning of [illegible] injury. Against the Japanese beetle grub on 5% kerosene emulsion only 25 to 5[illegible] kill.

438
1921. Davis, J. J.

Orchard Insect Problems.

Hoosier Horticulture, Indiana Hortic. Soc., Vol.III, No. 2, pp.19-24.

Miscible oil is recommended for scale.

439
1921-Davis, J. J.

The Chinch Bug in Indiana.
Purdue Univ. Dept. Agr. Extens. Bul. 99, 8 pp.

Kerosene emulsion is effective if bugs become established in corn, although it may burn the corn. A 10% emulsion is made by dissolving 1/2 lb. of laundry or fishoil soap in 1 gal. of hot soft water, to which is added while still hot, 2 gals. of kerosene. The mixture is thoroly churned to an emulsion. This is then diluted with 17 gals. of soft water for use. When plants are beyond recovery, pure kerosene may be used.

440
192? Davis, J.J.

Insect Problems in Indiana [illegible]

Jour. Econ. Ent. [illegible]

Miscible oil, 1-1[illegible] very good control.

441
1923 - Davis JJ.

The San Jose Scale.
Purdue Univ. Dept. Agr. Extens. Bull. 114, 12.pp.

Lubricating oil emulsion is prepared as follows: Liquid potash fishoil soap 4 lbs., Oil (such as Diamond Paraffin, Red Engine and Nabob) 4 gals., soft water 2 gal. If soft water is not available use lye or sal soda 1 lb. to 100 gals. to soften it. The three ingredients are placed together in a cooking vessel and heated ~~(until it comes)~~ to a boil. A scum will appear; after boiling a few minutes the scum will disappear. Then remove the heat and pump the liquid into itself about twice under pressure of 50 to 60 lbs. While the liquid is still hot. To make a two percent emulsion use 6 gals. of this stock to a 200 gal. tank. This spray can be used in fall or spring on both apple and peach. When San Jose scale was not checked by a dominant spray, it is desirable to spray with this oil about the latter half of June. A 2% emulsion will kill the immature scales and not injure foliage.

442
19[illegible]. Davis, J.J.

Comparative tests with dormant sprays [illegible] San Jose scale Control.

Jour. Econ. Ent. vol 17, no. 2, pp. 285-289.

See Supplementary abstract

443
1925. Davis, John J., Ackerman, A.J.

Lothers, [illegible] and Haseman, L.

Report on Oil emulsions. Jour. Econ. Ent. vol. 18, no. 2. pp. 410-413

See Supplementary abstract

444
1921 - Davis, J. J. & Luginbill, P.

The Green June beetle or fig eater
N. Carolina Agri. Exp. Sta. Bull. 242, 35 pp.

An 8 to 10% kerosene emulsion was quite effective in destroying the white grubs of the green June beetle when applied at the rate of about 1 gal to 6 or 8 sq. ft. and afterwards washed into the soil by sprinkling with water. The R & H formula is given using a soft soap, preferably fish oil, rosin soda or rosin potash soap. A more expensive ~~emulsion~~ but more easily emulsified and more penetrating emulsion may be made by dissolving 4-1/2 lbs whale oil soap in 3 qts

of hot soft water, to which is added 1 qt of fusel oil and 2 gals kerosene and the whole thoroughly churned. Kerosene emulsion may ~~xxxxxxx~~ cause injury where the grass is tender.

445
1918. Dean, M. L.

Division of Horticulture.

Third Bienn.Rept.Washington State Dept.Agric. 1916-1918, pp. 74-134.

Distillate oil emulsion, at the rate of 1-1/2 gals. of emulsion to 100 gals. water, was applied to trees infested with red spider. The spiders were killed and no injury resulted from the use of the oil.

446
1902. Dearness, J., Bunting,W.H., & Mills, J.

Winter treatment and summer treatment of San José scale.
Ontario Dept.Agr.Spec.Rpt.,1902,Oct.28,4 pp.
Kerosene emulsion 1-6 emulsified with whale oil soap in the proportions of 1/2 lb. per gal of oil gave the best results in the summer treatment.
Crude petroleum made in the same way was more injurious to the foliage. Fairly satisfactory results were obtained with crude petroleum 1 gal. and 1 lb. whale oil soap in 4 gals. water, applied mechanically, when used as a winter treatment.

447
1919. Delmege, J. A.

Some practical notes on the prevention of mosquito breeding.

Jl.Trop.Med.& Hyg.,Vol.XXII,No.19,pp.181-184.

Petroleum was found unsatisfactory for use as a larvicide. It was impossible to obtain a good surfact film of oil. The film of oil was easily blown aside by wind or dispersed by frogs.

448
1915. D'Emmerez de Charmoy, D.

Report of the Division of Entomology.

Ann. Rept. Dept. Agric., Colony of Mauritius for 1914, pp. 17-20.

Spraying with kerosene and phenyl mixture at 1% succeeded in controlling the poultry flea.

449
1918. Dentrom, H. A.

Cultivation of the robuster types of coffee. Dept.of Agrc.Ceylon,Leaflet No. 10.

Trop.Agriculturist, Peradeniya,Vol.LI,No.4, pp.218-224.

The R & H kerosene emulsion formula is given for use against the green bug.

450
1916. De Ong, E. R.

Soaps and miscible oils.
Mthly.Bull.Cal.State Commiss.Hortic.,Vol.V,No. 5, pp.172-176.
Soap is the third substance that must be used to make oil and water compatible. Cresylic acid adds greatly to the solubility of soap in petroleum oils. The cresol soap has become one of the most important emulsifiers of petroleum oils. The chief use of cresol soap is in making miscible oils. The following formula for making a miscible oil is given:

Fish oil	1 gal.)	Heat to 290-300° F.
Cresylic acid	1.5 gal.)	and then add kerosene
Caustic soda	0.5 lbs.)	and water.

Kerosene ----- 3 gals.
Water -------- 2 gals.

451
1918. De Ong, E. R.

Dried fruit insects.

Mthly.Bull.Cal.State Commiss.Hortic.,Vol.VII, No. 6, p.429.

The walls and floors of infested rooms should be sprayed with gasoline or engine distillate before the new crop is brought in.

452
1921. DeOng, E. R.

Suggestions for the control of red spiders in deciduous orchards.
Mthly.Bull.Cal.Dept.Agric.Vol.X,Nos.5-6,pp.186-191.
The most effective control for the brown mite is winter spraying with crude oil emulsion. A 4% solution has proved satisfactory. The distillate oils, which have been tested, when prepared as emulsions or miscible oils, have in all cases proved inferior to crude oil.

453
1922. DeOng, E.R.

Summary of Measures for Control of red spiders on deciduous trees.
Mthly.Bull.Cal.State Dept.Agric.,Vol.11,No.7, pp. 30-36.
To kill the winter egg of the brown or almond mite, spray in Dec. or Jany. with crude oil emulsion 4 to 12% strength.

454
1922. de Ong, E.R.

The relation of hard and alkaline waters to the preparation and dilution of sprays and dips.

Jour. Econ. Ent. vol. 15, no. 5, pp. 339-345.

See Supplementary abstract.

455
1925. de Ong. E.R. and Knight, Hugh.

Emulsifying agents as an inhibiting factor in oil sprays.

Jour. Econ. Ent. vol.18, no. 2, p. 24.

See Supplementary abstract

1926 deOng, E.R.
456
Technical aspects of petroleum oils and oil sprays.

Journ. Econ. Ent. vol. 19,No. 5, pp.733-745.

See Supplementary abstract

457
1926. de Ong, E. R.

The use of petroleum oils as insecticides.

Oil and Gas Jour.Vol.24,No.36,p.142.

This article was read before the American Petroleum Institute, Bull.Vol.VII No.27, pp.191-196,

1899 - Des sissis,
458
A mole cricket

Jour. Dept. Agr. West Australia, Dec. 1899, p 23

The injection into the ground of a mixture of CS_2 and kerosene is used for destroying the mole cricket.

1922 - De Vertenil, E.
459
Anopheles and malaria control in the Brighton-La Brea rural sanitary district.

Trinidad, B.W.I., Trans. R. Soc. Trop. Med. & Hyg., Vol. XVI, No. 3, pp 99-118

All pools and collections of stagnant water that could not be drained were sprayed with crude oil.

460
1920. Dietz, H.F. and Zetek, J.

The black fly of citrus and other sub-tropical plants.
U.S.D.A. Bull.885. 55 pp.
Kerosene emulsion, made by using 1 gal. of kerosene, 10 oz. of laundry soap, and 1 gal of water, is recommended for the black fly at 5 and 10% strengths. The 10% emulsion caused some burning of the citrus trees. The 5 per cent dilution proved very effective and completely freed the trees from the black fly after one or two sprays were used.

461
1892. Dinwiddie, R. R.

Some Texas fever experiments.

Ark.Agr.Expt.Sta.Univ.Bull.No.20,31 pp.

Pyrethro-kerosene emulsion was used successfully against lice and fleas on domestic animals.

462
1914. Dixon, W. R.

East Coast fever. Its prevention and eradication.

Jl. Union S. Africa, Pretoria,VII,No.6, pp. 541-552.

The following dip is used: Arsenite of soda (80% arsenious oxide), 8 lbs., soft soap 5-1/2 lbs., Kerosene 2 gals., water 400 gals.

463
1921 - Dixon, R. W.

East Coast fever - Its prevention and eradication.

J. Dept. Agric. Union S. Africa, Vol.3, No. 5, pp 436-445

When the short interval dipping is used the following formulas are given. Three day's interval arsenite of soda, 4 lbs; soft soap 3 lbs; kerosene 1 gal; water 4 gals; 5 to 7 days interval; arsenite of soda 8 lbs; soft soap 6 lbs; kerosene 2 gals; water 400 gals.

464
1897 - Doane, R.W.

A few facts about insects.

Wash. Agr.Expt.Sta. Bul. 27; 52 pp.

The R & H formula and the sour milk formula are given for kerosene emulsion.

465
1899 - Doane, R.W.

Insects and diseases affecting the prune.

Wash. Agr.Expt Sta.Bul. 38, pp. 37-44.

The R & H kerosene emulsion formula is given.

466
1913, Doane, R. W.

The rhinoceros beetle in Samoa

Jour. Econ. Ent. Vol. 6, No. 6, pp 437-442

Injury to the trees was increased when kerosene was added to tar. Kerosene did not increase the repellent action of the tar.

467
1920. Dohanian, S.M.

Mosquito Control in a Southern Army Camp. Jour. Econ. Ent., vol. 13, no. 4. ~~Aug.~~ pp. 350-354.

A mixture of: kerosene 30 o/o
crude oil 70 o/0

was used to oil pools.

468
1911. Donon, D.

La cochylis ou ver des vendanges.

Jour.d'Agric.Pratique,Vol.75,T.21,pp.653-656.

The winter chrysalides may be destroyed by a winter wash of heavy oil.

469
1904 - Doten, S.B.

The Western Cricket.
Nevada Agr. Expt. Sta. Bul. 56.

Kerosene, deadly to lucusts, has surprisingly little effect on these crickets. Part of a swarm of full-grown ones were sprayed with pure kerosene and most of them recovered.

470
1908 - Doten, S.B.

The European elm scale.
Nevada Agr.Expt.Sta. Bul. 65; pp. 5-34.

Kerosene emulsion formula: Dissolve one bar (½ lb) "pale savon", a common yellow washing soap in 2 qts. of boiling water. 1 gal. kerosene of good grade is poured in the boiling soap solution after its removal from the fire, the whole mixed and emulsified by pumping thru a force pump for 10 minutes. This was used at 10%, 12½%, and 16-2/3 % strengths. Scalecide is an insecticide which in appearance and action resembles kerosene emulsion. Its base is a heavier oil than kerosene and it seems far more effective.

Scalecide was used 1-9 and 1-15. The 1-9 gave an efficiency percent of 99.7 while 1-15 was only 90% efficient. Kerosene at 16-2/3% gave about 80%; at 12½% about 50% and at 10% about 40%.

471
1915. Doty, A. H.

The extermination of the mosquito.

Jl. Amer.Med.Assn.,Vol.LXIV,No.22,pp. 1836-1838.

Petroleum oil should be used only for temporary purposes. Semi-refined rather than crude oil should be used for the latter does not spread over the surface of the water.

472
1918. Dove, W.E.

Some biological and control studies of Gastrophilus haemorrhoidalis and other bots of horses.

U.S.D.A. Bull. 597. 52 pp.

Kerosene oil used as a wash is ineffective in destroying the eggs of Gastrophilus.

473
1920. Dudley, John E. Jr.

Control of the potato leafhopper (Empoasca mali Le B.) and prevention of "hopperburn".

Jour. Econ. Ent. vol.13, no. 5, pp. 408-415.

3 applications of kerosene emulsion (10 o/o) did not noticeably reduce the number of adults, but killed the nymphs readily. No repellent effects were observed.

474
1921. Dudley, F. H.

Report of the State Horticulturist.
19th Ann.Rept.Maine Commiss.Agric.1920, pp.26-49.

Kerosene emulsion is recommended for the rose and apple leaf hoppers.

475
1925. Dudley, J.F.,Jr.

Cull onions as a trap crop for the onion maggot.

Jour.Econ.Ent.Vol.18,No.4,p.639.

The problem of destroying the puparia before emergence of the flies was solved by treating the rows of culls with a mixture of crude road oil (45%), crank case drainings (45%), kerosene (8%), and creosote (2%). This mixture was applied at the rate of 1 gal. to every 25 ft. of row. The treatment killed 83% of the stages of the insect.

476
1914 - Durst, C. E.

An efficient and Practicable Method for controlling Melon lice.
Illinois Agr. Exp. Sta. Bul. 174, pp. 319-334.

Kerosene emulsion was used several times but ~~(at no time)~~ did not prove satisfactory for melon lice. It invariably produces serious injury to the foliage and is entirely unsuited for tender foliaged plants like muskmelons and cucumbers.

477
1922. Duruz, W.P.

1922. The cherry fruit sawfly and its control.

Mthly.Bull.Cal.State Dept.Agric.,Vol.XI,No.4, pp.393-399.

Nicotine sulphate plus a miscible oil has proved satisfactory in controlling the cherry fruit sawfly.

478
1922. Duruz, W. P.

Peach twig borer experiments in California.

Jour. Econ.Ent.Vol.15,No.6,pp.395-400.

The oil sprays were not effective when used against the peach twig borer.

479
1922. Dutt, A.

Supplementary note on the pests of the date palm in Iraq.

Mesopotamia, Dept. Agric.,Basrah,Memoir 6, 1922, pp.13-21.

The R & H formula for kerosene emulsion is given.

480
1922. Dutt, A.

Report of the Asst. Entomologist, for the year 1921.
Admin.Rept.Mesopotamia,Dept.Agric.,1921,pp. 61-63.
Kerosene emulsion was used effectively on the peach stem aphids.

481
1897. Earle, F. S.

Japanese plums.

Alabama Agr.Expt.Sta.Bul.85.

A strong kerosene emulsion will destroy the plum louse; a kerosene water mixture 1-5 may be used for this louse without injury to the tree.

482
1916-Edmundson, W. C.

Insect Pests of the Orchards and Gardens of Idaho and Their Control: - Idaho Agr.Expt.Sta. Bul. 87, 31 pp.

Scalecide gave the best results in spraying for San Jose scale. Dormant soluble oil has been very satisfactory. These are most effective when the trees are heavily encrusted. The oil sprays should not be used stronger than recommended.The oils must be thoroly emulsified or the free oil may cause injury to the trees. The oyster shell scale may be controlled by spraying when the young are hatching, with miscible oil. Spray two or three times, about 1 week apart. Scurfy scale may be controlled in the same way.

Eurpoean fruit scale is controlled in the same way as the San Jose scale. Cottony maple scale must be sprayed 2 or 3 times about a week apart when the young first appear, using kerosene emulsion. For the European Fruit lecanium Scalecide used as a dormant spray will kill a large percentage, kerosene emulsion applied at intervals of a week apart when the young appear, should give good results. Cabbage and melon aphis are controlled by using kerosene emulsion; also onion thrips; Kerosene emulsion formula: Water 1 gal, whale oil soap 1/2 lb. or laundry soap 1 lb., Kerosene 2 gals. It is made in the usual manner.

483
1918- Edmundson, W. C.

Sprays for the Control of San Jose Scale.

Univ. Idaho Agric. Expt.Sta. Bul. 108, 16 pp.

Scalecide was used in 1915-16-17, and gave the best results. It was diluted 6 and 7 gals. to 100 gals. of water. Crude oil testing 16°Be was also used. In 1915 the following formula was used: 30 gals. liquid soap, 20 gals. crude oil, water to make 200 gals. In 1916 the oil was increased to 25 gals. A crude oil of 26° Be used in 1915 gave poor results and was dropped from the tests. Dormant soluble oil was used in 1916-1917 at the rate of 7 gals. to 100 gals. water. Scalecide gave best results of all sprays tested. The cost of scalecide is prohibitive. The results with crude oil were discouraging, and it is not recommended. Results from the use of Dormant Soluble Oil were very satisfactory. It is a very effective spray for the control of San Jose scale.

484
1918- Edmundson, W. C. & Welch, J. S.

The Home Garden in Idaho.
Univ. Idaho Agr. Expt.Sta. Bul. 106, 30 pp.

Kerosene emulsion formula: kerosene, 2 gals. whale oil soap 1/2 lb. or laundry soap 1 lb., water 1 gal. Make in the usual manner and dilute 1-10. It is used on cabbage and melon aphis, also onion thrips.

1918, Enders, H. E.
485

Dwarfing effect of attacks of mites of the genus Eriophyes upon Norway maples. Proc. Indiana Acad. Sci. 1917, pp. 79-84

Winter spraying with kerosene emulsion diluted 1-5 or 7 will exterminate the mites. The emulsion penetrates the buds and kills the mites hibernating there.

486
1925. English, L.L.

A preliminary report on the preparation of insecticide emulsions with a colloidal clay.

Jour. Econ. Ent. vol. 18, no. 3, pp. 513-515.

See Supplementary abstract.

487
1919. Esam, G.

Control of red mite and woolly aphis.

Jour.Dept.Agric.N.Zealand,Vol.18,No.4,p.216-217.

For the control of woolly aphis and red mite on deciduous nursery stock, the tests show that dipping is successful provided the plants are submerged for 3 minutes in oil at 1-10.

488
1910. Essig, E. O.

Spraying for the citrus mealy bug.

Pomona Jour.Ent.,Vol.2, No.3, pp.246-259.

Gasoline in its pure state was too severe for a tree insecticide, though it had excellent killing properties for the mealy bug.

489
1911. Essig, E.O.

Spraying for black scale on deciduous fruit and olive trees.
Mthly.Bul.Calif.Comm.Hort.Vol.1,No.1, pp 15-17.
The following spray formulas are given for use on the black scale:

Distillate-water, mechanical mixture,

Spray distillate(28°Be)	10 gals.
Water	200 gals.

The distillate is added to the water in the spray tank and thoroughly agitated before and during application.

Distillate-Caustic soda, Water Mixture;

Distillate (28°Be)	10 gals.
Caustic soda(95-98%)	7 lbs.
Water	200 gals.

The caustic soda is added to the water and dissolved before adding the distillate. This is agitated like the first spray.

A resin wash may be made as follows:

Resin	10 lbs.
Caustic soda 75%	3 lbs.
Fish oil	1-1/2 gals.
Water	50 gals.

The R & H formula for making kerosene emulsion is given also a distillate emulsion prepared like the kerosene

-2-

Essig. Mthly.Bul.Cal.Comm.Hort.No.1. (Contd.)

emulsion but with the following proportions:

Distillate oil (28°Be)	20 gals.
Whale oil soap	30 lbs.
Water, to mix	12 gals.

For use, add 1 gallon of stock to 20 gals of water.

A crude petroleum emulsion is made as follows:

Crude petroleum (distillate)	5 gals.
Whale oil soap	2-1/2 lbs.
Sal soda	2 lbs.
Water	5 gals.

For use, dilute 1 gal. of stock to 15 gals. of water.

490
1914. Essig, E. O.

The cherry fruit sawfly.

Mthly.Bul.Com.Hort.Calif. 3, No. 1, pp.31-25.

A distillate-oil emulsion containing nicotine is recommended to kill adults at time of egg laying.

491
1915. Essig, E.O.

Injurious and beneficial insects of California. Supplement to Mthly.Bul.Calif.Com.Hort.Vol.4, No. 4,541 pp.

Emulsions are oil sprays in which soap is most frequently used as an emulsifying agent. They have a hi high power of penetration and a rapid and even distribution over the sprayed surface. In the miscible oils the emulsifier is incorporated in the oil.

Two types of kerosene emulsion are given. (1) That made by the Cook formula; (2) That made by the R & H formula.

Distillate emulsion is made by the following formula:

Distillate (28°Be)	20 gals.
Whale oil soap	30 lbs.
Water to mix	12 gals.

Crude oil emulsion is made as follows:

Water	175 gals.
Liquid soap	3 gals.
Crude oil (21° - 24°)	25 gals.

Distillate oil mechanical mixture:

Water	200 gals.
Caustic Soda (95%)	7 lbs.
Distillate (28° Be)	10 gals.

The distillate emulsion and tobacco is used for pear thrips. To every 200 gals. of diluted distillate emulsion 1 pt. of tobacco extract (40%)nicotine) is added. 49

492
1917. Essig, E.O.

The olive insects of California.

Calif. Agr. Expt. Sta. Bull. 283, p. 41-64.

Crude oil emulsion formula; crude oil (21° - 24° Baume) 15 gals; liquid soap (or 20 lbs. hard fish oil soap, 3 gals; water 175 gals. Distillate caustic soda water mixture requires 7 gals. Distillate (28° Baume), caustic soda (95%) 5-7 pounds, water to make 200 gals. The oil emulsions, distillate caustic soda water mixture, and miscible oils often separate out if the water contains much mineral matter and should be applied only with a good power machine with a forceful agitator, which must be kept going to avoid oil injury to the trees.

493
1917. Essig, E. O.

The laurel psyllid.

Jour.of Econ.Ent.,Vol.10, No.4, p.439.

Spraying with miscible oils and oil emulsions readily kills all stages if repeatedly and thoroly applied.

494
1922. Essig, E.O.

The Pear Thrips. California Univ. Agric. Expt. Sta. Berkeley. Circ. 223, 9 p.

Formulae for homemade distillate emulsion for stock use: Distillate 27° Baume 20 gals; Fish oil soap 24 lbs; caustic soda 12 lbs; hot water to make 20 gals. For sprays use 10 gals. of the distillate emulsions; Black Leaf 40, 1 pt; water to make 200 gals. Miscible oils may be used according to formula; miscible oil 5 gals; "Black Leaf 40" 1 pt; water to make 200 gals. These formulae are used against the "black thrips". For "White Thrips" the same formulae may be used if the oil content is reduced and the nicotine increased as follows. Distillate emulsion 6 gals; "B.L.40" $1\frac{1}{2}$ pts., water to make 200 gals. Miscible oil 3 gals; "B.L.40" $1\frac{1}{2}$ pts; water to make 200 gals.

495
1922. Essig, E.O.

Control of the Brown Apricot scale and the Italian Pear scale on Deciduous fruit trees.

California Univ. Agric. Expt. Sta. Circ. 224,

See Supplementary abstract.

496
1922. Essig, E.O.

Mealy bug Control on Pear trees.

Jour. Econ. Ent. vol 15, no. 2, 131-132.

See Supplementary abstract

497
1925 - Essig, E.O.
The blackberry mite and its control.

Calif. Agr. Expt. Sta. Bul. 399, 10 pp.

For dormant or early spring sprays, the improved highly refined lubricating oil emulsions are satisfactory.

498
1910. Eustace, H.J. & Pettit, R.H.

Mich.State Agr.Coll.Expt.Sta. Sp.Bul. 51, 16 pp.

Kerosene emulsion is made by the R & H formula. When ready to use, 1 part of stock is diluted with 8 or 10 parts of water.

499
1911 - Eustace, H.J. & Pettit, R.H.
Spray and practice outline for fruit growers, 1911.
Mich. State Agr.Coll.Expt.Sta. Special Bul. 54, 20 pp.

Place 2 gals. kerosene in a place to warm, Boil 1 lb. of laundry soap or whale oil soap in 1 gal. of soft water with until dissolved. Add the kerosene and agitate vigorously for 10 min. For use dilute 8 or 10 times.

500
1912 - Eustace, H.J. & Pettit, R.H.
Spray and practice outline for fruit growers, 1912.

Mich. State Agr. Coll. Expt. Sta Special Bul. 57, 17 pp

Eustace, H.J.and Pettit, R.H.
Same as special Bul. 54 of this station.

501
1913 - Eustace, H.J. & Pettit, R.H.
Spray and practice outline for fruit growers, 1913

Mich. State Agr. Coll. Expt.Sta. Special Bul.61, 23 pp
Eustace, H.J. and Pettit, R.H.
Same as special Bul. 54 of this station.

502
1914 - Eustace, H. J. & Pettit, R. H.
Spray and practice outline for 1914.
Mich. Agr.Coll.Expt.Sta. Special Bul. 69, 24 pp.
Eustice, H.J. and Pettit, R.H.
Same as special Bul. 54 of this station.

503
Eustace, H. J. and Pettit, R.H.
1915. Spray and practice outline for 1915.
Mich. Agr. Col. Expt. Sta. Special Bul. 73, 24 p.

Same as (Eustace and Pettit) Spec. Bul. 54 of this station

504
Eustace, H. J. & Pettit, R. H.
1919. Sptay and practice outline for fruit growers.
Mich. Agr. Col. Expt. Sta. Special Bul. 93,32 p.

Same as (Eustace & Pettit) special Bul. 54 of thes Sta.

505
1922. Evans, H. H.

Oyster shell scale.

Agric.Jl. of British Columbia, Vol.VII, No.7, pp.154-155.

Dormoil and fuel oil were used in the spring as the buds began to swell. These sprays gave nearly 100% control on the oyster shell scale. No apparent injury to the trees resulted from their use.

506
1913 - Ewing, H.E.
Some External Parasites of Poultry.

Oregon Agric. Coll. Bul. 92, Extension Series, II. No. 5. 16 pp.

Spraying of hen houses with kerosene or gasoline will help to control the chicken mite. Kerosene emulsion applied to the legs of chicken for the itch mite causing scaly leg is recommended. A dust prepared by mixing $\frac{1}{2}$ pint crude carbolic acid & $1\frac{1}{2}$ pints gasoline in 5 lbs. of plaster of Paris is recommended for the common hen louse. Kerosene and gasoline are recommended for various pests of fowls.

507
1914. Farrant, A. L.

Notes on mal de caderas.

Jl. Bd. Agric. British Guiana, Vol.VII, No.3, pp.142-147.

R & H formula for kerosene emulsion is given.

508
[illegible] - F[illegible], [illegible]

[illegible] in Victoria

[illegible] Victoria, Vol. [illegible] 7, [illegible]

The apple bark [illegible] quickly subdued by [illegible]ing crude petroleum [illegible] 1-[illegible] or red oil 1-15.

509
1902 - Faurot, F.W. & Stinson, J.T

Notes on spraying and spray machinery.
Missouri Sta. Fruit Expt.Sta. Bul. 5, 31 pp.

Dissolve ½ lb. hard soap in 1 gal. of water by boiling and stirring. Remove from the fire and add 2 gals. kerosene. Mix by pumping ~~and~~ violently thru' a force pump. For scale dilute 1-9, for summer use and on other insects dilute 1-19. Kerosene and water mixture for summer 1-9 and for early spring 1-4.

510
1913 - Fawcett, H. S.

The Effects of Spraying.
Florida Agr.Expt.Sta. Rpt. 1912, pp. LXXIII-LXXVII.

In 1911 spraying tests were made primarily to discover the effects of sprays in controlling Stem-end rot due to Phomopsis citri. Incidentally information was obtained as to the effect on scale insects and white fly. The sprays used was Bordeaux mixture 3-3-50; commercial lime sulphur 30 Be; (1 gal. to 25 gals water); and Yothers' flrmula 1 (3 gals. Jr. Red engine oil, and 2 gals. whaleoil soap to 200 gals. water) Counts of the number of scale insects per fruit and per leaf, and of the white fly per leaf were made. Yothers' formula cut them down to practically nothing. The other two sprays showed an increase. The fruit staid greener longer with Bordeaux and Yothers' formula. The size of fruit was apparently diminished by Yothers' formula IV.

511
1912. Fawcett, H.W. & Burger, O. F.

Spraying and the citrus purple scale.

Florida Press Bul.183, 2 pp.

Yothers' Formula IV was used on the purple scale. It was made up of 3 gals. of Jr.Red engine oil and 2 gals. of whale oil soap to 200 gals. water.

512
1898 - Felt, E.P.

14th Rpt. of the State Entomologist.
N.Y.State Museum,Bul. Vol.5, no.23.

Kerosene emulsion is made by dissolving 2 lbs. hard soap in 1 gal. of boiling water and while still hot adding 2 gals. of kerosene and emulsifying by passing thru a force pump. Dilute with 9 to 15 parts of water before using. Where hard water prevails, better results may be obtained by using 1 gal. sour milk in the place of the hot water solution. Machines are made for emulsifying water and kerosene. Pure kerosene may be used in a fine spray on a bright drying day, with out serious injury.

513
1899 - Felt, E.P.

Shade tree Pests in New York State.
Bul. N. Y. State Mus,Vol.6, no.27, pp. 39-60.

Kerosene emulsion is one of the principal contact insecticides and is prepared by dissolving ½ lb. of hard soap in 1 gal. of boiling water. ~~and~~ While still hot add 2 gals of kerosene and emulsify by passing thru a force pump. When diluted with 9-15 parts water it will kill the young elm bark scales as they appear in the summer, When hard water is used the emulsion can best be prepared by using 1 gal. of sour milk in place of the soap solution. Mechanical mixtures of kerosene and water may also be used.

514
1900. Felt, E. P.

Crude petroleum as an insecticide.
Country Gentleman,Vol.LXV,No.2476,12 July, 1900, p. 569-70.

Crude petroleum and kerosene should be used with great caution. Injury has resulted from their use in most every case. A 20% crude oil and water mixture may be used with a fair degree of success.

515
1900 - Felt, E.P.

Some effects of early spring applications of insecticides on fruit trees.

USDA Div. of Ent. Bul. 26 n.s. pp. 22-25.

Pure kerosene and pure crude petroleum are dangerous to use on fruit trees. Mechanical mixtures and emulsion of these oils made with soap are comparativel safe to use if applied before the buds are open.

516
1901 - Felt, E.P.

The 16th Report of the State Entomologist on Injurious and Other Insects of the State of New York 1900.
Bull. N. Y. State Museum, Vol. 7, No. 36; pp. 949- 1063

Experiments with kerosene showed that neither a 20% nor a 25% mechanical mixture could be relied on to kill dormant San Jose scale, tho' either could be used in early spring with comparative safety to the trees. The experiments with undiluted kerosene were hardly satisfactory for the reason that few trees were involved and these were in bad condition on account of scale injury. Its use was not recommended. A 20% mechanical emulsion of crude petroleum was the most satisfactory spray for use on dormant scale insects in early spring.

The tests with the 25% mixture of crude petroleum were not markedly different from those with the 20% mixture. When trees were sprayed with the undiluted crude petroleum a few scale escaped, doubtless because the oil failed to reach them. Greater caution was needed when spraying with the undiluted oil. Whale oil soap and crude petroleum combination gave fully as good results as the whale oil soap solution but was not equal to the 20% crude petroleum mixture.

517
1901 Felt, E.P.

Scale insects of importance. New York State Mus. Bull. vol. 9, No. 46, pp. 289-382.

See Supplementary abstract

518
1902 - Felt, E.P.

17th Report of the State Entomologist on Injurious and other Insects of State of New York,1901
New York, State Mus. bul. 53; pp. 699-925.

Two types of crude oil were used in 1900; 41.8°Be and 43.3°Be. They were used in 20% and 25% mechanical emulsions. A mixture of Good's whale oil soap No. 3 in a solution of 1 lb. to 4 gals. of water was used with 10% and 15% oil of the 41.8°Be. The best results were obtained with either 20% Or 25% mechanical emulsions. The 41.8°Be oil apparently gave better results than the 43.3° Be oil, but this may have been accidental. The whale oil soap and crude petroleum combinations were very effective, but were not as good as the mechanical petroleum emulsions. None of the preparations injured the trees. Tests with the undiluted crude oil confirmed previous experiments as to its unreliability.

519
1902 - Felt, E.P.

Further notes on crude petroleum and other insecticides.
USDA Div. of Ent. Bul. 31 (n.s.) pp. 49-51.

Poor results were obtained with spring applications of kerosene and kerosene mechanical mixtures, Undiluted crude petroleum killed all trees to which it was applied. Mechanical mixtures of crude petroleum containing 20 & 25% oil apparently did not injure the trees. A very narrow range exists between the amount of oil needed to kill the scale and the amount that will not injure the tree.

520
1902 - Felt, E.P.

Experimental work in New York state against the San Jose scale.

USDA Div. of Ent. Bul. 37, n.s. pp. 35-6.

A 20% mechanical emulsion of a light crude petroleum (41.1°Be) was applied to 22 apple trees and to 14 plum, pear and quince trees. Later examinations showed little or no injury.

521
1903. Felt, E. P.

Crude petroleum as an insecticide.

Proc.Soc.Prom.Agr.Sci.1902,pp.86-95.

This paper is a review of the experimental work of such men as J.B.Smith, N.J.; C.L.Marlatt, W.M.Scott,Ga.; V.H.Lowe and F.A.Sirrine of N.Y., and F.M.Webster of Ohio, and many others.

522
1903 - Felt, E. P.

18th Rept of the State Entomologist on Injurious and Other Insects of the State of N. Y.,1902.
N.Y. State Museum Bul. 64, pp.89-193.

Tests with 20% mechanical crude petroleum emulsion were continued and the results of the earlier years were largely confirmed.

523
1903 - Felt, E.P.

Grapevine Root-worm.
New York State Museum Bul. 72, 55 pp.

Kerosene emulsion and crude petroleum have little value in controlling the grubs of the grapevine root worm. The insecticides were sprayed on the top of the ground around the base of the vines.

524
1903. Felt, E. P.

Recent work with insecticides in the East.
Colo.State Bd.Hort.for 1902,p.121-7.

Crude oil, undiluted, and as a mechanical mixture with water at 20% strength has been used extensively in the East with good success. The oil must be applied in early spring just before the buds begin to swell. The results have been uncertain in some instances. The Pennsylvania, West Virginia and Ohio crude oils seem to be better adapted for insecticide use because of their paraffin base. A mechanical mixer was used for applying the oil. This oil was used for the San Jose scale.

525
1904 - Felt, E.P.

19th Report of State Entomologist on Injurious and other Insects of the State of New York, 1903. N.Y. State Mus. Bul. 76, pp. 91-235.

Kerosene emulsion was recommended; for plant lice diluted 1-6 or 7., for N.Y. plum scale by spraying in the fall or early spring; for cabbage maggot diluted 1-12 to 15. Work on the San Jose scale was continued for the fourth year. The mechanical mixture of 20% crude petroleum was a very effective insecticide and showed very little injury from several annual early spring applications. The continued use caused increased thickness and roughness of the bark. A 20% mechanical mixture was tried as a summer wash. It undoubtedly destroyed a large number of scales and seriously checked breeding; a kerosene emulsion 1-6 or 10 dilution or a 15 or 20% mechanical mixture could be used in mid-summer but results were not satisfactory.

526
1904. Felt, E. P.

Remedies for the San Jose scale.

U.S.D.A.Bur.Ent.Bul.46, p.52-4.

Early spring applications of a 20% mechanical crude petroleum emulsion indicate that it was one of the most effective methods for controlling this pest. If the spraying is done properly no injury will result from its use.

527
1906 - Felt, E.P.

Experiments with insecticides on the San Jose Scale.
USDA Bur.Ent.Bul. 60; p. 137-8.

20 & 25% kerosene-limoid mixtures were tested but the results were not as good as those obtained with lime sulphur.

528
1910 - Felt, E.P.

25th Report of the State Entomologist.
N. Y. State Museum Bul. 141, 178 pp.

The standard kerosene emulsion diluted 1-9 or 1-15 is valuable for plant lice. Ready made oil emulsions are convenient for the small fruit grower. Masses of the army worms can be killed by a liberal spraying with kerosene emulsion.

529
1913. Felt, E.P.

Injuries following the application of petroleum or petroleum products to dormant trees.

..., pp. 160-161

See Supplementary abstract

530
1913 - Felt, E.P.

The Use of Oils on Dormant Trees.
28th Rpt. of State Entomologist on Injurious and other insects of the State of New York, 1912.
N.Y.Museum Bul. 165; 265.pp.

The use of oils or oil preparations on dormant trees has been followed in several cases by severe injury. Trees respond to climatic and cultural conditions and their power of resisting penetration and injury by oils undoubtedly varies with the season and probably from year to year. Since certain weather conditions promote injury by oils, it appears impossible to be sure that deleterious effects may not follow spraying, dormant trees. Fall treatment appears to be more hazardous than spring treatments. There is less danger of penetrating by oil and consequent injury if the applications are made in the spring shortly before active growth begins. Presumably at this time there is more resistance to the entrance of oils and destroyed tissue is quickly replaced.

531
1915 - Felt, E.P.

29th Report of the State Entomologist,1913,
Univ. State N.Y. Bull. 589, N. Y. State Mus. Bul. 175; 257 pp.

Miscible oils have been the cause of injury to sugar maples trees and cannot be recommended. Signs of oil injury are given.

532
1915-Felt, E.P.

30th Report of the State Entomologist on Injurious and other insects of the State of New York.
N.Y. State Museum Bull.180; 360 pp.

Oil injuries following applications of petroleum compounds to the bark of dormant trees was observed the past year. Injury resulted from the application in May 1913 of burlap strips soaked in lubricating oil to sugar maple trees set some 10 or 11 years previously

533 ✓
1916--Felt, E.P.

31st-Report of the State Entomologist on Injurious and other Insects of State of New York.
N.Y.State Mus. Bull. 186; pp.15-88.

Observations have shown that it is possible to kill the young of the hickory bark beetle by applying oils and oily compounds to the bark shortly after the adults become active. A compound was secured which had been highly recommended for application on trees. An analysis gave the following:

Percent water present	1.0
Homogenous	Yes
Specific gravity	1.062
% free carbon	.023

% distilling	110°C-170°C (light oil)	4.3
" "	170°C-235°C (carbolic oils)	13.4
" "	235°C-270°C (Creosote oil)	9.9
" "	270°C-300°C (Anthracene oil)	[illegible]
		27.[illegible]

Specific gravity of total distillate 1.022

Six out of ten trees died within 6 months after treatment with this material. Sugar maples were more susceptible to oil applications than many other trees.

534
1918 - Felt, E.P.

32nd Report of State Entomologist on Injurious and other Insects of State of N.Y.,1916,
N. Y. State Museum Bull. 198.

Kerosene emulsion is recommended for the larvae of the rose gall midge in the greenhouse.

535 1839 Fennell, J.H.

Injurious insects

Gardner's Gazette, London, Nov.23,1839, No.151 p. 447

Oil and soot well mixed together and rubbed in with a brush is an effective remedy for the woolly aphis.

536
1888. Fernald, C. H.

Injurious insects.

35th Ann.Rept.Secr.Mass.Board Agr.1887,p. 78-94.

The R & H formula is given, also the milk kerosene emulsion.

537
1888. Fernald, C. H.

Injurious insects.
Trans.Mass.Hort.Soc.for 1888,p.107-16.
The kerosene-milk emulsion is given. Also a kerosene soap formula as follows: 4 lbs. of common bar soap is didsolved in 1 gal.of hot water, then add 1 gal. of kerosene. This is churned to a gelatinous mass. The kerosene emulsions are used for sucking insects.

538
1888. Fernald, C. H.

Division of entomology.

Mass.Agr.Expt.Sta.Bul.2,pp.1-10.

Kerosene was poured on in sufficient quantity to moisten the entire ant hill. The nests were deserted and the ants either destroyed or driven away. The grass around the nest was killed.

539
1892 - Fernald, C.H.

Report on Insects - Division of Entomology.
Mass. Agr. Coll. Hatch Expt. Sta. Bul. 19, pp. 109-43.

Kerosene emulsion is made by dissolving $\frac{1}{4}$ lb. of common bar soap in 2 qts. of boiling water. ~~and~~ To this add 4 qts. of kerosene. The whole mixture is churned thru a hand pump with nozzle turned itno the pail. It must be diluted 1-9 before using. This insecticide is one of the best for the destruction of vermin on domestic animals and in hen houses. Roses infested with plant lice and red spiders were dipped in the emulsion and an examination 2 days later failed to show a single plant louse or red spider and none appeared on the plants during the season.

540
1894 - Fernald, C.H.

The Horn Fly.

Mass. Agr. Coll. Hatch Expt. Sta. Bul. 24, pp. 11-15.

Work of Mr. Morgan of Louisiana Expt. Sta. given.

541
1894-Fernald, C.H.

A New Greenhouse Pest.
32nd Ann. Rept. Mass. Agr. Coll. 1894, 31 pp.
Kerosene emulsion gives good results when plants are dipped or sprayed ~~than~~ when applied with a brush. Emulsions prepared according to Cook's formula have given better results on Orthezia than those prepared by the Riley-Hubbard method.

542
1897. Fernald C. H. & Kirkland, A.H.

The brown-tail moth.

Mass. (Hatch) Expt.Sta.Special Bul.July,1897,15 pp.

The R & H formula for making kerosene emulsion is given. This emulsion was diluted 1-9. The caterpillars were jarred from the trees to the ground where they were sprayed with the kerosene emulsion.

543
1899. Fernald, H. T.

Supplementary report of the Zoologist.
Pennsylvania Dept.Agr.Rpt.1898,Pt.1,pp.373-443.
The R & H formula for making kerosene emulsion is given. This is recommended for the peach twig borer at the rate of 1 gallon of emulsion to 6 gals. of water. It was also used for plant lice and scale insects.

544
1901 - Fernald, H. T.

The Imported Elm Leaf Beetle.

Mass.Agr. Coll. Hatch Expt. Sta. Bul. 76, 8 pp.

For destroying the insects on the trunk and ground kerosene emulsion or the mechanical mixture of kerosene and water may be convenient. Kerosene emulsion ~~formula~~ formula: Dissolve $\frac{1}{2}$ lb. hard soap shaved fine in 1 gal. of boiling water, pour in 2 gals. of kerosene and churn until emulsified. 1-5 should be strong enough to accomplish the desired purpose. A soap powder known as laundry chips was used with success prepared as follows:

Laundry chips, ? lbs., kerosene 8 gals., water 35 gals., This was prepared with hot water and churned upon by adding the kerosene as indicated [illegible]. Kerosene and water mixture should be used in the proportions of 1 part of kerosene to 3 - water.

545
1902. Fernald, H. T.

Three common orchard scales.

Mass.State Bd.Agr.Rpt.1901,pp.353-363.

Kerosene will kill the scale and is likely to kill the trees as well. Crude petroleum may be used but must test above 43° Baume.

546
Fernald, H.T.
1902?
U.S. Dept. Agr. Bureau Ent. Bul. 40, p.44

Crude oil ~~XXXX~~ and kerosene against San Jose Scale infesting fruit trees.

547
1903 - Fernald, H.T.

Orchard treatment for the San Jose Scale.
Mass Agr.Coll. Hatch Expt.Sta.Bul. 86, 15 pp.

Crude petroleum and water mixture was tested; a 410 oil was used. A kerowater barrel pump for mixing the two was set for 30% oil but varied as much as 15% each way while the pumping was continuous. About 43.2% of the trees were freed of scale. With kerosene and water the same difficulties were met as with petroelum. The variation was from 18 to 38 with the pump set at 30. Better results were obtained, 44.4% of the trees were freed of scale.

548
1907 - Fernald, H.T.

The San Jose Scale & Experiments for its control
Mass. Agr. Coll. Hatch Expt. Sta. Bul. 116, 22 pp

Kerosene limoid mixture was used according to formula; limoid 33-$\frac{1}{3}$-3 lbs., kerosene 8-13 gals., water 25 gals. It was quite difficult to produce a satisfactory emulsion and the results on the scales were far from satisfactory, the trees being badly infested again as early as July 21st, while others all around them treated with ordinary lime-sulphur wash were in excellent condition.

549
1908 - Fernald, H.T.

Insect Enemies of Shade Trees.
Mass. Agr. Expt. Sta. Bul. 125, pp. 49-64.

Kerosene emulsion formula: $\frac{1}{2}$ lb. hard soap is dissolved in 1 gal. of boiling water. Add 2 gals. of kerosene and emulsify to a soft butter-like mass. This is used for the imported elm leafbeetle. The cottony maple scale can be controlled by winter spraying with 18-20 % kerosene emulsion.

550
1913 - Fernald, H.T.

Tests of Insecticides.
Mass. Agr.Expt.Sta. Rpt. 1912, pt. 2, pp. 88-91

Entomoid is claimed to be a combination of lime-sulphur and a miscible oil, and should possess the good qualitites of both these materials. Several apple, pear and plum trees, and currant bushes considerably infested with San Jose scale were sprayed with it, diluted 1-50. Two trees were sprayed with a 1-40 dilution. The material seems to have some value as an insecticide but more experiments will be needed before a final formula can be established. the spray was not effective at the dilutions used.

551
1913 - Fernald, H.T. & Bourne, A.I.

~~Experiments for the control of the~~ Onion Maggott.
Mass. Agric. Expt. Stat. Rpt.1912, pt. 1, pp. 171-179.

Kerosene emulsion was prepared according to the usual formula and was diluted 1-9, 1-14 and 1-19. It was applied with a force pump without a nozzle so that a solid stream ~~could~~ be obtained and the ground around the plants were well soaked with the emulsion. No injury to the plants was observed at either strength. Little protection from maggots was observed as a result of this treatment.

552
1914. Fernald, H. T. & Bourne, A. I.

Notes on the onion thrips and the onion maggot.

Jour. Econ.Ent.Vol.7,No.2,pp.196-200.

Kerosene emulsion 1-9, 1-14 and 1-19 were applied for the onion maggot. The different strengths seemed to give no difference in results and no injury to the plants or protection from the maggots.

553
1894. Field, C. H. B.

Kerosene as an insecticide.

The Ohio Farmer, Vol.LXXXV, No.5, Feb.1, 1894, p.97.

Pure kerosene was dropped on a number of garden insects from an oil can. Every insect was killed.

554
1919. Fielding, J. W.

Notes on the bionomics of Stegomyia fasciata, Fabr. (Part 1).

Ann. Trop., Med.Parasit., Vol.XIII, No.3, pp.259-296.

Petroleum soft soap emulsion 1-5000 acted as a stimulus to the hatching of resistant eggs. Resistant eggs were those exposed to conditions other than normal, as change of water, lowering & raising of temperatures. Those eggs which did not hatch in three days were known as resistant.

555
1919. Fisher, D.F. & Newcomer, E.J.

Controlling important fungus and insect enemies of the pear in the humid sections of the Pacific Northwest.

U.S.D.A.Farmers' Bul.1056, 34 pp.

Kerosene emulsion is a satisfactory oil spray if carefully made and properly diluted. Crude oil emulsion is fully as efficient as kerosene emulsion for a dormant spray.

556
1901. Fisher, G. E.

San Jose scale discussion.

31st Ann.Rept.Ont.Ent.Soc.for 1900, p. 26-8.

Kerosene has been somewhat unsatisfactory as a remedy. Crude petroleum has given the greatest satisfaction, Great care must be used in applying it.

557
1903. Fisher, G. E.

Canadian experience in the use of lime, sulphur and salt for San Jose scale.

Proc.West.N.Y.Hort.Soc.1903, pp.134-137.

Crude petroleum is not recommended for the peach, but for use on other varieties of fruit trees its cheapness, its adhesive and diffusive qualities and its fatal effect on the scale makes it a good remedy for those who can use it successfully. Kerosene emulsion properly made and applied in hot dry weather is almost as good in summer as crude petroleum is in winter.

558
1903. Fisher, G. E.

Report of Committee on San Jose scale.

34th Ann.Rept.Fruit Growers' Assn., Ontario, 1902, p.69-72.

Crude petroleum is more fatal to the scale than soap. A crude petroleum emulsion was used with success. 1 gal.crude petroleum, 2-1/2 lbs. whale oil soap and water to make 5 gals. This injures the foliage more than kerosene and cannot be used on peach. Kerosene emulsion is the best for summer spraying.

559
1903. Fisher, G. E.

Report of the inspector of San Jose scale 1902.

Ann.Rept.Dept.of Agr.of the Province of Ontario 1902, pp.3-24.

Undiluted crude petroleum is a concentrated remedy and must be applied lightly. Diluted crude oil is an excellent remedy to use on resistant varieties in the proportions of 20% with water. Its penetrating and distributing qualities makes it very searching and assist in getting a perfect covering. Crude oil emulsion may be used as a summer spray. Kerosene emulsion results were affected by the weather.

560
1905. Fisher, G. E.

The pear tree psylla and how to deal with it.

Canada Ent., Vol. 37, No.1, pp. 1& 2.

Crude petroleum 1 part in 16 parts water proved the most satisfactory treatment for the pear tree psylla.

561
1892. Fisher, J.

The pear tree psylla.

Mass.Agr.Expt.Sta.Bul.17, p.24.

Kerosene emulsion may be used whenever the winged forms show themselves in numbers.

562
1902? Fiske, W.F.

U.S.Dept.Agr. Bur.Ent. Bul.40, p.39

Crude petroleum against San Jose Scale infesting peach trees.

563
1922. Flebut, A. J.

The grape mealy bug.

Mthly.Bull.Cal.State Dept.Agric., Vol.11, No.7, pp.6-11.

Spraying with a miscible oil before the buds open, using the heavier oil and spraying after the buds open using the lighter oil will help to control the mealy bug.

564
1899. Fleet, W. J.

Experiments in the treatment of red spider.

Indian Museum Notes Vol.4, No.3, pp.114-117.

The R & H formula is given. Diluted 1-15 when used. This spray was almost as effective as sulphur dust.

565
1888. Fletcher, J.

Report of the entomologist and botanist.

Canada Expt.Farms Rept.1887, pp.8-41.

The R & H formula is given for use on turnip aphis when diluted 1-9.

566
1891. Fletcher, J.

Report of the entomologist and botanist.

Canada Expt.Farms.Ann.Rept.1890. p.154-177.

The R & H kerosene emulsion is the most satisfactory remedy for the diamond back moth larvae. It should be diluted 1-9 before using.

567
1891. Fletcher, J.

Report of the entomologist and botanist.

Canada Experimental Farms Ann.Rept.1890, pp.154-206.

Kerosene emulsion has been used with good effect on the cabbage maggot.

568
1892. Fletcher, J.

The horn fly.

Canada Central Expt.Sta.Farm Bul.14, 11 pp.

The R & H kerosene emulsion formula is the best remedy for the horn fly. It kills all the flies it reaches when it is sprayed over the cattle and prevents others from coming as long as the odor lasts.

569
1894. Fletcher, J.

The San Jose scale.

Rept.Ent.Soc.Ontario 1894, pp.73-76.

The R & H formula kerosene emulsion diluted 1 - 9 for summer spraying and diluted 1 - 4-1/2 for a winter wash is recommended for the San Jose scale.

570
1894. Fletcher, J.

Injurious fruit insects of the year 1894.

Rpt.Ent.Soc.Ontario.1894,pp.76-81.

Against the cigar case-bearer, kerosene emulsion sprayed early in the spring has given the greatest success.

571
1894. Fletcher, J.

Rept. of the Entomologist & Botanist.

Canada Exp. Farms Rept. for 1893.

The Cook formula for kerosene emulsion is given and recommended for sucking insects.

572
1895. Fletcher, J.

Injurious insects.

Canada Central Exp.Farm, Bul.23,pp.18-23.

The R & H formula for kerosene emulsion is given. It is recommended for sucking insects.

573
1899. Fletcher, J.

Report of the entomologist and botanist.

Canada Expt.Farms Repts.1898, pp.167-219.

Kerosene emulsion is recommended for the carrot rust-fly, turnip aphid and root maggots. For scale insects, kerosene emulsion applied early in the spring is an effective remedy.

574
1901. Fletcher, J.

Report of the entomologist and botanist.

Canada Expt.Farms Rpts.1900,pp.195-248.

Crude petroleum has given good results as far as the scale is concerned. A mechanical mixture of water with 30% crude petroleum may be used quite safely on apples. This was not a perfect remedy.

575
1902. Fletcher, J.

Report of the entomologist and botanist.
Ann.Rept.Expt.Farms,Canada,for 1901,p.197-262.
Crude petroleum, where it has been thoroughly applied, has had a decidedly quicker and more fatal effect upon the scale than whale oil soap, but it is also very much more liable to injure the trees. Crude petroleum may be applied to healthy peach trees in a 20 to 25 % mechanical mixture with water. Care must be used in its application. Canada crude oil should test 39.5° to 39° Be.for spraying use. The gravity oil gave better results on scale and less injury on trees than the Pennsylvania crude oil of 44.5° Be.

576
1903. Fletcher, J.

Report of the entomologist and botanist.

Canada Expt.Farms.Rpts.1902,pp.178-206.

For the hop aphid, kerosene emulsion diluted 1-25 will kill the insect on the hop foliage. To destroy the winter eggs on plum trees, a dilution of 1-6 is necessary.

1904? Fletcher, J.
577

U.S.Dept.Agr. Bur.Ent. Bul.46, p.25

Carbolic acid & kerosene emulsion against Horse flies infesting horses.

578
1905. Fletcher, J.

The buffalo carpet beetle.

Canada Ent.,Vol.37,No.9,pp.333-334.

Benzine or gasoline should be sprayed in the cracks of floors with an atomizer.

579
1920. Fletcher, T. B.

Report of the Imperial Pathological Entomologist.
Scientific Repts.of the Agric. Research Inst., Pusa,1919-1920, pp.95-108.
Kerosene was used as a repellent for fruit flies.

580
1923. Flint, W.P.

Shall we change our recommendations for San Jose Scale Control?

Jour.Econ. Ent. vol.16, no. 2, pp. 209-216

See Supplementary abstract.

581
1926. Flint, W. P. & Bigger, J. H.

Control of the fruit tree leaf roller with lubricating oil emulsion.
Jour.Econ.Ent.,Vol.19,No.1, pp.49-52.
It is pointed out that from 1922 to 1924 the fruit tree leaf roller increased in abundance in western Illinois orchards, and for the first time became a serious pest of apples in that section, having destroyed up to 50 per cent of the entire crop in some of the largest orchards in 1924. Experimental work during the winter of 1924-25 has shown a very high kill of eggs by the use of 8 per cent boiled lubricating oil emulsion and by some of the commercial oils. A nearly complete clean-up of leaf roller was obtained in some of the largest orchards by spraying with 3 per cent oil emulsion.

582
1925. Flint, W.P. and Compton, C.C.

A new method for controlling the onion maggot.

Jour, Econ Ent. vol.18, no. 1, pp 111-116

See Supplementary abstract

583
1920. Flippance, F.

A guide to the palm collection in the botanic gardens.II.

Gardens' Bull.,Straits Settlements, Singapore, Vol.II,No.7,pp.246-258.

Coccids and scales are treated with a soft soap-kerosene mexture.

584
[illegible]

[illegible] of Date Palm Scales.
[illegible] Sta. Bull. 56, pp. [illegible]

8 applications during five years of very strong kerosene emulsion failed to eradicate Parlatoria blanchardi. Endurance by the palms of concentrated kerosene emulsions was sufficiently demonstrated. Distillate spray noticeably blanched the foliage but was ineffective against the scales.

585
1883 - Forbes, S.A.
Experiments on chinch bugs.

U.S.D.A. Div. Ent. Bul. 2, pp. 23-25.

Kerosene emulsion made with soap suds, milk or potash is effective against the chinch bug when they are hit by it. Kerosene and water 1-20 is equally effective.

586
1899 - Forbes, S.A.

Recent Work on the San Jose Scale in Illinois,

Ill. Agric. Expt.Sta. Bul. 56, pp. 241-287.

Forbes, S. A.
See 21st Rept. of State Entomologist of the State of Illinois.

587
1894 - Forbes, S. A.

Insect Injuries to Indian Corn.
18th Rept of the State Entomologist of Ill. 162 pp.
Kerosene emulsion and pure kerosene were applied to wireworms in the soil. The treatment was ineffective; any strength sufficient to kill the worms also killed the vegetation. Kerosene emulsion may be applied to infested lawns, and if followed by a copious watering may kill large numbers of white grubs. Petroleum was mixed with fertilizer for the corn root louse. It had a repellent effect. In consequence the ants withdrew the aphids deeper into the ground, with little diminution perhaps of the injury to the corn.

588
1894 - Forbes, S. A.

The Chinch Bug in Southern Illinois in 1894.

Ill. Agric. Expt.Sta. Bul. 33, pp. 397-399.

Any bugs accumulating in a deep furrow may be killed with a mixture of kerosene and water. 1-8. If bug pass a barrier and collect on the outer rows of corn they may be killed with kerosene emulsion made by mixing two parts kerosene with 1 pint of soap suds violently agitated. This may be diluted with 10 or 12 parts water and applied with a sprinkler or in a spray.

589
1895-Forbes, S. A.

Report of the State Entomologist, 19th Rept. of the State Entomologist of Illinois. 206 pp.

Chinch bugs on the corn may be killed with kerosene emulsion made and applied as follows: Dissolve ½ lb. of hard or soft soap in 1 gal. water, heat to boiling and then add 2 gals. of kerosene churning the mixture with a spray pump for fifteen minutes. To each quart of this emulsion add 5 qts. of water and apply to the corn as a spray. A teacup full to a hill is sufficient For white ants in buildings gasoline, kerosene and benzine can be used. If plants become infested kerosene emulsion will be convenient. It must be used freely to saturate the infested tissues and to kill the ants in their burrows.

590
1896. Forbes, S. A.

Insect injuries to the seed and root of Indian corn.

Ill.Agr.Expt.Sta.Bull.44,pp.209-296.

Crude petroleum mixed with fertilizers had no deterrent effect upon the root aphis of corn or the attendant ants.

591
1898 - Forbes, S. A.

Mid-summer measures against the Chinch Bugs.
20th Rept. of the State Entomologist of Illinois, pp. 35-44.

Kerosene in salt, and crude petroleum were tried as barriers for the chinch bug without success.

592
1900 - Forbes, Stephen A.

Recent Work on the San Jose Scale.
21st Report of the State Entomologist of the State of Illinois, pp. 1-49.

Pure kerosene was applied to peach trees. The results were unsatisfactory. If applied in sufficient quantities to kill the scales the trees were severely injured. Kerosene and water mixtures containing 5, 15 and 20% of kerosene did not hurt the trees neither did they kill the scale. 1, 2, and 4% solutions of carboleum were without pronounced effect upon the scale and did no permanent harm to the trees.

Test of "Success Kerosene Sprayer".

Indicated percentage	Actual percent in spray: Open stream pump worked vigorously	Fine spray pump worked moderately	Very fine spray worked vigorous
5	6.92	5.94	4.07
10	13.13	12.	7.5
15	18.3	17.4	11.
20	22.75	21.	17.
30	32.8	30	20.5
40	43.4	40.	
50	48.	46.6	

593
1900 - Forbes, Stephen A.

The Economic Entomology of the Sugar Beet.

Ill. Agric. Expt. Stat. Bul. 60, pp. 397-532.

Kerosene is used for plant lice, leaf hoppers and other insects which pierce the leaf and suck the sap. It may be applied as an emulsion with soap suds; or as a mechanical mixture with water.

594
1902 - Forbes, S.A.

Methods and Results of Field Insecticide Work Against the San Jose Scale, 1899-1902.
Ill. Agric. Expt.Sta. Bul. 80, 31 pp.

Kerosene emulsion in strength sufficient to kill scale is uncertain in its action on the more delicate trees, and on any that are in poor condition. 20% emulsion caused serious injury to peach and was not strong enough to kill the scale. 25% emulsion is usually harmless to the apple and pear. Convenience of application belongs to kerosene emulsion. This was not a soap emulsion but a mechanical mixture of the oil and water.

595
1903 - Forbes, S. A.

Experiments and Observations on the Use of Crude Petroleum and Pure Kerosene for the San Jose Scale.

22nd Rept. of the State Entomologist of Illinois, pp. 91-95.

This experiment shows that apple, pear, and cherry trees may be safely treated with either pure kerosene or crude petroleum, the latter of rather light specific gravity, provided the treatment is made after spring conditions are established and the fruit buds have begun to swell. Then only apply the spray so as just to cover the surface of the bark. Both insecticides were very effective, killing nearly all scales. (over)

On the other hand, the peach was endangered by both application, even under favorable conditions. The gummy black residue from the petroleum kept canker worms away from the trees upon which it had been sprayed.

596
1905 - Forbes, S. A.

Field Experiments & Observations on Insects Injurious to Indian Corn.
Ill. Agric. Expt. Sta. Bul. 104, pp. 95-152.
Kerosene emulsion prepared by mixing 2 parts of kerosene and 1 of soap suds by violently beating with a stick for about 5 minutes, and diluting to contain 4% of kerosene, was found efficient for the destruction of chinch bugs, and was successfully used in clearing of corn along borders of a field which had become infested for lack of effective barriers. Stronger kerosene mixtures made in this way proved injurious to the plant.

597
1906 - Forbes, S. A.

Comparative Experiments with Various Insecticides for San Jose Scale.
Ill. Agric. Expt. Sta. Bul. 107, pp. 241-261.
The soluble petroleum compound known as "Scalecide" applied in March 24 in a 5% mixture with water showed a Sept. infestation of 2.6 degrees equivalent to a benefit of 47%, less than any of the lime and sulphur washes. It was the best of the ready-made insecticides tested that year. A kerosene preparation known as "Fruitolin" was tried and several variations of a 20% kerosene mixture with lime, in lieu of soap solution was tried. These gave a benefit ratio of 19%.

598
1906. Forbes, S. A.

The corn root aphis and its attendant ant.

U.S.D.A.Bur.Ent.Bul.60.pp.29-39.

Treatment of the seed with kerosene completely protects the young plant for several weeks. The treatment unfortunately injures the young corn itself.

599
1907 - Forbes, S. A.

The Cottony Maple Scale in Illinois.
Illinois Agr. Exp. Sta. Bul. 112, pp. 343-360.

Summer experiments with kerosene emulsion showed one application of a 10% emulsion at the middle of the hatching period, to kill about two-thirds of the scales and two applications, at middle and end of hatching period, killed about four-fifths. Winter applications more effective; a single treatment with 19 or 20% emulsion kills from 86 to 91% of the insects. Diseased or weakened trees are liable to serious injury by the kerosene emulsion. The emulsion was made according to the following formula: Dissolve 1 lb. common soap or 1/2 lb

of whale oil soap in 1 gal. of water by boiling. Remove from fire, and add 2 gals. of kerosene. Then emulsify by pumping thru a spray pump. For a 10% emulsion add 17 gals. of water to the 3 gals. of stock For an 18% emulsion add 8 gals. to the stock. Soft water is preferred.

600
1908 - Forbes, S. A.

Experiments with repellents against the corn root aphis, 1905 and 1906.
Ill. Agr.Expt.Sta. Bull. 130, 28 pp.
Thirty minutes soaking of seed corn in kerosene before planting, injured the seed but protected the plants against root aphis in preliminary field experiments made in 1905. Summer plot plantings made in 1905 showed no injury after a moderate use of kerosene Kerosene emulsion results were conflicting. Kerosene was used in two ways in pot experiments in 1906, (1) by mixing it thoroughly with the seeds in quantities varying from 1/6 of a fluid oz. to 3½1/3 ozs. for each gallon of corn. (2) by soaking the seed in the kerosene. The kerosene used in field tests in 1906
(over)

gave the poorest results of all materials used. It showed some repellent effect. In a small special test, made by planting a few hills of corn close around nests of ants in the field, kerosene kept the insects away from the corn.

601
1908. Forbes, S. A.

Experiments with repellents against the corn root aphis.
Journ.Econ.Ent.Vol.I,No.2,p.81-3.

Kerosene was effective in repelling the corn root aphis and ants but considerable damage was done to the germinating seeds.

602
1915 - Forbes, Stephen A.

Observations and Experiments on the San Jose Scale.
28th Rept. of State Ent. of State of Ill, p.63-79

Scalecide 1-20, and Target Brand Scale Destroyer 1-20, were used in tests along with other materials, They were not as effective in controlling the scales as the lime sulphur mixtures.

603
1915 - Forbes, S. A.

Observations and Experiments on the San Jose Scale
Illinois Agr. Expt. Sta. Bul. 180, pp. 545-561.
Scalecide 1-20 and Target Brand scale destroyer 1-20 were used in tests with lime sulphur in 1907-8. These did not give as good results as the sulphur sprays There was little difference between fall and spring sprayings. In 1909 San-U-Zay was used. It was applied in March and seemed practically equal in value to the solutions of lime and sulphur. In 1911 Scalecide was used 1-15. It gave about the same results as in 1907. Spraying operations with various preparations of lime and sulphur and with two brands of miscible oils justify the use of the sulphur solutions, especially because of their more prolonged effect when applied in the spring.

604
1916 - Forbes, S. A.

The Chinch Bug Outbreak of 1910-1915.

Twenty-ninth Report of the State Entomologist of the State of Illinois, pp. 71-127.

Kerosene emulsion at 5% strength will kill the chinch bugs at a reasonable expense. But it is rather liable to kill the corn plant. From 60 to 86% of the bugs were killed with a 4% solution on corn two feet high. The emulsion was made by dissolging 8 oz. of soap, in 1 gal hot water, adding 2 gals. of kerosene, and pumping the mixture into itself severaltimes, Petroleum oils were tried out as barriers. Some proved very good and others were not so good, owing to the differences in the oils.

605
1916 - Forbes, Stephen A.

The Chinch Bug Outbreak of 1910 to 1915.
Univ. Illinois Agr. Expt. Sta. Circ. 189, 59 pp.
See Forbes 29th Rept. of State Entomologist of Illinois

606
1913 - Foster, S.W.
The cherry fruit sawfly.
USDA Bur. Ent. Bul. 116; pt. III, p. 73-9.

Early morning spraying with a 3% distillate oil emulsion to which nicotine sulphate has been added at the rate of 1 to 2000 killed many adults.

607
1911. Foster, S.W. & Jones, P. R.

How to control the pear thrips.
U.S.D.A.Bur.Ent.Circ.131, 24pp.
A distillate-oil emulsion gave the best results. When the emulsion was used strong enough to kill all the thrips, there was considerable oil injury to the buds. The emulsion was made as follows: 12 gals.hot water, fish or whale oil soap,30 lbs; distillate oil, (raw) 30°-34°Be 20 gals. The water and soap are placed in the spray tank with the agitator running, then the oil is added and the mixture thoroly agitated.and pumped into itself at 175 lbs. pressure. When a 3% solution is needed, use 5-1/2 gals. of stock to 100 gals.of water.

608
1899. Fowler, C.

Some insects of the year 1899-1900

Calif. Agr. Exp. Sta. Rpt. 1899, 1901, Pt. 1, pp 73-85

[illegible]

609
1918 - Fracker, S.B.
San Jose scale, what it is and how to control it.
Wisc. State Dept. Agric. Circ. no. 10, 4 pp.

The scale may be controlled by spraying in the fall or early spring with a miscible oil, as Scalecide (1-12) or kerosene emulsion 1-3½.

610
1892 - Francis, M.
The cattle tick, Preventive measures for farm and range use.
Texas Agr.Expt.Sta.Bul.24, pp.253-256.

A combination of lard and kerosene gives good results. Kerosene emulsion (10%) does fairly well on the ticks.

611
Frankforter, C.J. The chemistry of petroleum. The chemistry of the cracking process explained. Discussion of homologous series. Oil News, vol. 8, Aug. 5, 1920, pp. 32, 34, 36.

612
1915 - Franklin, H.J.
Report of Cranberry Substation for 1914.

Mass. Agr.Expt.Sta. Bul. 160, pp. 93-117.
When a bog infested with gypsy moth is flooded, the worms usually float ashore in large numbers and should be killed by spraying with crude oil or kerosene. The cranberry fruit worm was not killed when the cocoons were kept wet with a mixture of 1 part scalecide and 5 parts water for a whole hour in the laboratory. This was not tested in the field.

613
1919-Franklin, H.J.
Seventh Report of the Cranberry Substation from 1917 to 1919.
Mass. Agric.Expt. Sta. Bul. 192, pp. 105-141.

5 gals. kerosene were poured on a 6 acre pond to kill gypsy moth caterpillars floating on the flowage. It was poured on the windward side. The worms were a third grown. The treatment was successful.

614
1920 - [illegible], A. D.

Notes on blood sucking flies in North Russia during the summer of 1919

Bull. Ent. Res. XI, Pt. 3, pp 195-198

Paraffin is rubbed on ponies to repel the flies

615
1920. Freeborn, S. B.

Malaria control. A report of demonstration studies at Anderson, California.
Calif. State Bd.Health,Monthly Bull.March,1920, Vol.15,No.9, pp.279-288.
Oil was necessary in certain stages of the work. It was found that 10.5 gals. of oil were required per acre.

616
1917. Freeborn, Stanley, B. and Atsatt, [illegible]

The effects of petroleum oils on Mosquito larvae.

Jour. Econ. Ent., vol 11, no. 3, pp. 299-308.

See Supplementary abstract.

617
1918 - French, C.

The rutherglen bug

Jl. Dept. Agric. Victoria, Vol. XVI, No. 12 pp 738-740

This insect can be kept in check by the use of kerosene spray.

618
1897. Froggatt, W. W.

Entomological Notes.

Agric. Gaz. of N.S.W. Vol. 8, No. 2, pp. 99-104.

When the grape destroying beetle is on foliage of peach trees, a weak spray of kerosene emulsion will destroy both eggs and beetles.

619
1897. Froggatt, W. W.

Red Scale.

Agr. Gaz. N.S. Wales, Vol. 8, Pt. 5, p. 351.

A combined kerosene and resin emulsion, as follows, was found to be very effective against red scale: 8 lbs. soft soap, 24 lbs. best resin, 8 lbs. sulphur, 4 gals. kerosene, 4 gals. water, Dilute 1-16 before using.

620
1899. Froggatt, W. W.

Notes on fruit maggot flies with description and new species.

Agr. Gaz. N.S.W. Vol. 10, No. 6, pp. 497-504

Kerosene water traps were used.

621
1899. Froggatt, W. W.

White Ants.

Agr. Gaz. N.S.W. Vol. 10, No. 6, pp. 585.

The cheapest, most durable, and most effective dressing for floor-joists, fence posts and any timber likely to be attacked by white ants is kerosene oil. It penetrates the wood and acts as a repellant.

622
1900. Froggatt, W. W.

The passion-vine frog-hopper.

Agric. Gaz. of N.S.W., vol. 11, No. 8, p. 650-1.

Kerosene emulsion was an efficient remedy and one application destroyed all the insects infesting the vines.

623
1901, Froggatt, W. W.

Two new wheat pests

Agr. Gaz. N.S.W. Vol. 12, No. 3, pp., 350-356

A kerosene in water trap was used on the Rutherglen bug.

624
1906. Froggatt, W. W.

Thrips or black fly.

Agric. Gaz. of N.S.W., Vol. 17, No. 10, p. 1005-1011.

When plants are in pots and are small they can be ~~taken and~~ dipped up side down in kerosene emulsion.

625
1909. Froggatt, W. W.

Locusts in Australia and other countries.

Agric. Gaz. of N.S.W., Vol. 20, No. 1, pp. 949-954.

Kerosene 1 gal. & water 7 gals. will kill every insect it touches. Kerosene 1 gal., hard soap 1/2 lb., water 8 gals. is also very effective on the younger stages of the locusts.

626
1910. Froggatt, W. W.

Locusts in Australia and other Countries

Dept. Agr. N.S. Wales, Farmers' Bul. 29. 40 pp

Kerosene 1 gal & water 7 gals, mixed mechanically will kill every insect it touches. Kerosene emulsion is made as follows; kerosene 1 gal; hard soap 1/2 lb: water 8 gals. The soap is dissolved in boiling water and then the kerosene is added.

627
1910. Froggatt, W. W.

Plant bug pests.

Agric. Gaz. of N.S.W., Vol. 21, No. 2, p. 151-2.

Kerosene emulsion is the most effective contact spray for plant bugs. It should be sprayed under the trees as well as over the trees.

628
1912. Froggatt, W. W.

Woolly aphis or American blight.

Agric. Gaz. of N.S.W. Vol. 23, No. 6, p. 520-528.

The only method to clear an orchard of woolly aphis appears to be the use of some oil emulsion ~~as~~ sprayed on with good pressure and the more thoro the drenching of all cracks and crevices, the more perfect the cure.

629
1914, Froggatt, W. W.

Animal parasites

Agri. Gaz. N.S.W. Sydney, Vol. XXV, No. 9, pp. 765-770

The short-nosed cattle louse is easily removed by spraying the infested animal with kerosene emulsion.

630
1916, Froggatt, W. W.

The rutherglen bug

Agric. Gaz, N.S.W. Sydney, Vol. XXVII, No. 4, pp. 270-272

Kerosene water traps may be used for catching the bugs. Kerosene and blue oil emulsion may often be used effectively.

631
1918 - Froggatt, W. W.

The apple-leaf jassid

Agric. Gaz. N.S.W. XXIX, No. 8, pp. 568-571

Kerosene emulsion is an effective contact poison for these insects in all stages of development.

632
1919, Froggatt, W. W.

Some plant bugs that infest citrus trees.

Agric. Gaz. N.S.W., Vol. XXX, No. 5, pp. 325-330

When orchard trees are badly infested with swarms of immature bugs, a kerosene or oil emulsion mixture well sprayed among the foliage will kill the soft wingless larval forms.

633
1919, Froggatt, W. W.

The Pine tree aphis (Chermes pini)

Agric. Gaz. N.S.W., Vol. XXX, No. 10, p. 742

Nursery trees should be dipped in kerosene emulsion before they are sent out, or at any rate planted out.

634
1924 - Frost, S. W.

Four years experiments on the control of the red spider.

Jour Econ. Ent. vol. 17, no. 1, pp. 101-104

Miscible oils kill a large % of the eggs (87.6, 53, and 71.4% in 3 experiments).

635
1924 - Frost, S. W.

Insect Pests in 1923 - 24.

Penna. Agric. Expt. Sta. Bul. 188, pp, 13-17. Studies were made to determine the value and extent of the use of commercial and home mix emulsions. The applications were made in the dormant and delayed dormant sprays. In the home mixtures, red engine oil and kerosene oil were used. The following formula gave a very stable mixture: 3 gals. oil, 1½ lbs. Kayso, and 300 gals. of water. The oil, Kayso and a small amount of water were mixed by means of a bucket pump, forming a stock emulsion. No curning was noticed even when applied as late as the petal spray with the full dormant strength. The home-mix emulsions compared favorably with the commercial mixtures. A comparison was made on the basis of the size of the oil globules and the ability of the oil to remain in an emulsions.

636
19__. Frost, S.W.

The delayed dormant oil spray for killing apple red-bug eggs.

Jour. Econ. Ent. vol 18. no. 3. pp. 1_-1_.

See Supplementary abstract

637
1925. Frost, S. W., and Horsfall, J. L.

Zoology and entomology.

Penn.Agr.Expt.Sta.Rept.Bul.196,pp.32-3.

The results of work with the red spider in 1924 were duplicated in 1925. Additional data were secured to show that both home-mixed oil emulsions, commercial emulsions, and miscible oils will kill a large percentage of the eggs of the red spider if applied to apple at the time of the delayed dormant spray. Cold mixed calcium caseinate emulsions have been used with success with various types of oils ranging from a viscosity of 12 to 250 Saybolt at 100°F. The oils of the higher viscosity were more satisfactory.

638
1916. Fryer, J. C. F.

Plum Aphides.

Jl. Bd.Agric.London,Vol.XXIII,No. 7, pp. 661-664.

Kerosene emulsion may be used to control this aphid. The following formula is given: Kerosene, 1 pt., soft soap, 1 lb., liver of sulphur, 2 ozs., water, 10 gals.

639
1918. Fullaway, D. T.

The corn leafhopper.

Hawaii Bd.Agric.Forestry,Honolulu,Div. Entom.,Bull. 4, 16 pp.

Very weak kerosene emulsion will control the nymph of the leafhopper.

640
1922. Fullaway, D.T.

Insect problems of the pineapple industry.

Hawaiian Forester and Agric.,Vol.XIX,No.1, pp.5-12.

Kerosene and distillate emulsified with ivory soap and whale oil soap was used on mealy bugs and scales.

641
1896. Fuller, C.

Insect pests.

Agric.Gaz.N.S.W.Vol.7,Pt.7,pp.4__-453.

The R & H formula is given. Dilute 1-30 for use on the larvae of the small cabbage moth.

642
1904. Fuller, C.

Mosquitoes.

Natal.Agr.Jour. & Min.Rec.,Vol.7,No.1, pp.50-56.

Kerosene is recommended for killing mosquito larvae.

643
190_. Fuller, C.

The Woolly Aphis.

Natal Agr.Jour.and Min Rec.,Vol.7, No.3,pp.241-246.

Kerosene emulsion was used as a remedy for the woolly aphis.

644
1906. Fuller, C.

The plague locust of Natal.

U.S.D.A.Bur.Ent.Bul.60, pp.171-174.

Kerosene emulsion is occasionally used for the insect in the first larval period.

645
1910. Fuller, C.

The froghopper trouble.

Natal Agr.Jour.Vol.14,No.4,pp.397-401.

Spraying with a mechanical mixture of kerosene and water is the most promising method of destroying the insect.

646
1923. Fulmer, H. L.

Insecticides and fungicides.

Ontario Dept.Agric.,Bull.302, 48 pp.

A method for emulsifying crude petroleum, taken from Connecticut (Storrs) Agr.Expt.Sta.Bul.4, is given. The R & H formula for kerosene emulsion is also given.

647
1921 - Fulton, B.B.

The Fruit tree Leaf-roller.

Rept. on Progress of Investigation - 3rd Crop Pest & Hortic. Rept., 1915-20.

Oregon. Agric. Expt.Sta. pp. 82-88.

Oil sprays gave rather conflicting results. Fuller's earth was added to one spry to give it body so that the trees would receive a heavier coating. It was used at the rate of 20 lbs. to 100 gals. of spray. The test was not conclusive. A heavy miscible oil, 8-100 applied after the buds show green at the tip and before the blossom cluster buds begin to spread is recommended.

648
1907- Gahan, A.B.

The Peach Lecanium or Terrapin Scale.

Maryland Agr. Expt.Sta.Bul. 123; pp. 153-160.

Three kinds of miscible oils were used (Kilescale, Scalecide, and Soluble Petroleum) during the dormant season. They were put on 1-22.5, 1-15 and 1-10; kerosene emulsion 10% was put on in August as a summer spray. This was made in the usual manner. The kerosene spray accomplished the least good. The miscible oils gave very good results. The 1-10 and 1-15 strengths were better than the 1-22.5. The oils affected the scales immediately, whereas lime-sulphur had a delayed effect. The scales became loosened upon the twigs shortly after the oil was applied, and many of them dropped off before the breeding season began

1920 - Gahan, C. J.
649

Furniture beetles

Brit. Mus. Nat. Hist. London, Economic Ser. No. 11, 23 pp.

Benzene was applied with a brush or injected with a syringe into the worm holes wherever they appear on the surface.

650
1910. Gallard, L.

Experiments for the destruction of peach aphis.

Agric.Gaz.N.S.W.Vol.21,No.4,p.367.

Scalecide 1-25 applied after the trees burst into leaf, did no injury and killed all the aphis. Kerosene emulsion 1-10 did not kill one-third of the aphis.

651
1894. Galloway, B. T.

Some observations on new and old insecticides and their combination with fungicides.

Insect Life, Vol.7, p.126-132.

Lime and kerosene when shaken together form an emulsion. The milk of lime is prepared first, then the kerosene is added at the rate of 1-5, 1-10, 1-15, 1-20, 1-25 or 1-30. The lime and kerosene are churned together. Kerosene was added to Bordeaux mixture. Paris green may also be added to the combination. It was found that a thick emulsion was made by churning together while cold equal parts of resin wash and kerosene.

1916, Gardiner, R. E.
652

An Appliance for destroying the french bean fly.

Queensland Agric. Jl. Vol. VI, No. 4, pp 223-231.

The bean fly is caught on a glass surface sprinkled with kerosene.

653
1892. Garman, H.

Some common pests of thefarm and garden.

Kentucky Agr.Expt.Sta.Bul.40, 48 pp.

Train oil was used as a repellant for the horn fly. Kerosene emulsion made by the R & H formula was used on the maple tree bark-louse, diluted 1-3.

654
1896. Garman, H.

Entomological Notes for 1895.

Kentucky Agr.Expt.Sta. 8th Ann.Rept.for 1895, pp.37-57.

Dilute kerosene emulsion will kill the harlequin cabbage bug if it can be made to reach the pores of the insects.

655
1897 - Garman, H.

The San Jose Scale in Kentucky.
Ky. Agr.Expt.Sta.Bul. 67, pp. 43-59.

Kerosene emulsion is a standard remedy for such insects as San Jose scale, but appears not to be as effective as ~~as~~ the soap wash. Kerosene, 2 gals. soap (whale oil) $\frac{1}{2}$ pound, water 1 gal. The soap is dissolved in 1 gal. of hot water and at once churned with the kerosene by passing it thru' a force pump. A quart of soft soap may be usedin place of the whaleoil soap It is customary to dilute with 3 to 4 times as much ~~mak~~ water before applying it to the leaves of plants. For winter use it may be used stronger, without injury to the trees.

656
1901 - Garman, H.

Enemies of Cucumbers and Related Plants, Part I.
Ky. Agr.Expt. Station Bul. 91, pp. 3-56.

For the melon aphis kerosene emulsion is more effective than tobacco decoction. It may injure plants but this is avoided by proper dilution. The emulsion is prepared according to the accepted formula: $\frac{1}{2}$ lb. soap (whaleoil if possible) 1 gal. water, 2 gal kerosene. One part of the emulsion to 9 of water makes a suitable spray for most plants. This emulsion can also be used to kill the squash bug, but must be diluted and used with caution to avoid injury to plants. Kerosene emulsion was used for cucumber thrips.

657
1901- Garman, H.

Dangerous Mosquitoes in Kentucky, Part 2.
Kentucky Agr.Expt Sta. Bul. 96, pp.199-215.

Where pools are not of value for stock or fishes probably kerosene might prove useful in lessening the number of mosquitoes

658
1902 - Garman, H.

Hessian Fly Experiments.

Kentucky Agr. Expt. Sta. Bul. 103, pp. 229-244.

Kerosene emulsion consisted of $\frac{1}{2}$ lb. whale oil soap in 1 gal. water. Churned with 2 gals. of coal oil. 1 part of this was used with 9 parts of water. This reduced the infestation to 9%. It is probable that it ~~mak~~ checks the injury in part by destroying the eggs.

6[illegible]
1908 - Garman, H.

Apple Orchard Pests in Kentucky.
Ky. Agr. Expt. Sta. Bul. 133, pp. 14-71.

Kerosene emulsion is made by dissolving $\frac{1}{2}$ lb. soap in 1 gal. boiling water; then while hot add 2 gals. of kerosene and pump rapidly thru a pump for 10 minutes. For use, dilute 1-9. The emulsion will not hurt most foliage if applied in a genuine spray at the proper dilution. It is a good substitute for the lime and sulphur wash for summer use. Scalecide and Kil-O-scale are substitutes for kerosene emulsion. They mix readily with water. They have not given good results when used as recommended, but when used 1-10 they kill the scale but cost more than lime-sulphur wash.

660
1910 - Garman, H.

Common Insecticides and fungicides with directions for the treatment of Farm Pests.

Ky. Agr. Expt.Sta. Bul.147; 39 pp.

Kerosene is a very valuable insecticide for special uses, but without dilution cannot be used on leaves of plants. For ants and bedbugs, it may be used pure. For plants an emulsion is necessary which may be made by dissolving $\frac{1}{2}$ lb. whale oil soap or laundry soap in 1 gal. boiling water, then adding 2 gals. kerosene and churning vigorously for 10 min. It Should be diluted 1-9 for use in destroying plant lice and bark lice. Crude petroleum is liable to do injury to plants. An emulsion can be made of it and has been used with good effect for scale insects in winter as well as for the destruction of cattle ticks. Homemade miscible oils can very readily be prepared by heating in a kettle, fishoil, crude ~~and~~ acid, and granulated caustic potash, then stirring into this crude oil or paraffin oil, and rosin oil, the latter being recommended as a help in making a permanent emulsion. Dilute 1-10 or 15 for use.

661
Garman, P.
1922.

Notes on the European red mite, Paratetranychus pilosus, C & F.

Conn. Agric. Expt. Sta., Bull. 234, 1922, pp. 146-152.

The following insecticides were used in the work against red mite eggs. Kerosene emulsion (10% kerosene); kerospray emulsion; keresol 1-18, an oil spray containing 70% kerosene; wormol, a miscible oil; Scalecide at dilutions of 1-25, 1-15, 1-35, 1-25; Jarvis compound, a miscible oil containing phenol, 1-15. A summary of these oils shows kerospray to have no possible kill; keresol 13.3%; kerosene emulsion 76.7%; wormal 83.4%; scalecide, 86.2%; Jarvis compound 99% kill The results of these tests show the value of miscible oils as ovicides, but it must be remembered that such oils if used in excessive quantities may become dangerous to apple trees. The greatest injury is done to the trunk and larger limbs. Again there is danger to the flower buds in the very late sprays, more than with lime-sulphur or substitutes since the oil works in more among the buds.

662
1922 - Garman, H., & Jewett, H.H.

The white flies of Hot Houses.
Ky. Agric. Expt. Station, Bul. 241, pp. 75-111.

Kerosene emulsion was made by following formula: Kerosene 2 gals., whale oil soap $\frac{1}{2}$ lb. and water 1 gal. The spray was made by mixing 1 part of the emulsion with 11, 12, 14 and 15 parts of water respectively. Schnarr's insecticide was also used. A spray was made of this emulsion by using 1 part of the emulsion to 30, 40, 50 and 60 parts of water, respectively. All the tests with kerosene emulsion showed that the leaves of the plants were injured. The spray did not affect the eggs. Dilutions of 1-11 or 12 killed a fair per-cent of the ~~larvae~~ larvae but few of the pupae.

Schnarr's insecticide at dilutions of 1-50 or 60 did not injure the plant and showed a fair control of both larvae and pupae. The eggs were very slightly affected, if at all, by these dilutions.

663
1919. Geiger, J. C. & Purdy, W. C.

Experimental mosquito control in rice fields.

Jour.Amer.Med.Assn.Vol.72, No.11, pp.774-779.

Both the fuel oil and the two-plus-one oil mixture (2 pts.kerosene & 1 part black oil) failed to spread thru rice when applied by drip can, but uniform distribution with satisfactory larvicidal action without harm to rice was secured by the use of oil-saturated sawdust.

679
1895. Gillette, C.P.

Report of the Entomologist.

Colorado Agr.Expt.Sta.Rpt.1894, pp.58-64.

Kerosene emulsion was recommended for leaf-rollers, woolly aphis and cabbage louse.

680
Gillette, C.P.
1897.

Sheep Scab.

Colorado Agr. Expt. Sta. Bul. 38, 40 p.

Kerosene emulsion was tried for sheep scab. The mites were first dipped for 1/2 min. in full and 1/2 strengths. At the end of 16 hours the mites were all lively though wet with kerosene. The experiments were repeated and at the end of 48 hours all the mites were lively. Failing with kerosene emulsion, pure kerosene was tried. Mites were dipped for one minute and at the end of two hours all were alive. At 16 hrs. some seemed dead, others were active. Kerosene, either pure or in the form of an emulsion, may kill the mites, but it is not rapid in its action.

681
1898. Gillette, C. P.

Colorado's worst insect pests and their remedies.

Colorado Agr.Expt.Sta.Bul.47, 61 pp.

The R & H formula is given. Dilute with 27 gals. of water when ready to use.

682
1900. Gillette, C. P.

Report of the Entomological Section.

Colorado Agr.Expt.Sta.Rpt.1899. pp.37-41.

Kerosene emulsion was tried as a remedy for the codling moth, but results did not warrant recommending it.

683
1901. Gillette, C. P.

Report of the entomologist.

Colo.Agr.Expt.Sta.14th Ann.Rept.for 1901.

Kerosene emulsion was ineffective against the false chinch bug. Kerosene emulsion was effective on the woolly aphids and their eggs.

684
1902. Gillette, C. P.

Notes on some Colorado insects.

U.S.D.A.Div.Ent.Bul.31,n.s.,pp.51-55.

Both the lice and eggs of Kermes sp. are readily killed by kerosene emulsion.

685
1906. Gillette, C. P.

Some of the more important insects of 1903.

Colo.Agr.Expt.Sta.Bul.94,15 pp.

Kerosene emulsion 1-3,1-4,1-6 were applied to egg masses of the fruit tree leaf roller. None hatched in the 1-3, a partial hatch was had from 1-4 and 1-6. No eggs hatched where crude petroleum was applied.

686
Gillette, C.P.
1906.

Insects and Insecticides.

Colorado Agr. Expt. Sta. Bul. 114, 46 p.

Formulas for kerosene emulsion: Soap 1 lb., kerosene 2 gals., water 27 gals. Formula for kerosene-milk emulsion, milk (sour) 1 gal, kerosene 2 gals. If sweet milk is used add a little vinegar. Kerosene and crude petroleum are used pure and also diluted with water, for the destruction of scales and other insects. When the oil is used at 40 parts to 60 parts of water, there is seldom any injury to apple, cherry, or pear trees, but it can hardly be applied to such tender trees as peach and plum, without further dilution. Gasoline is used chiefly for bedbugs.

687
[illegible]

See Supplementary abstract.

688
Gillette, C.P.
1916.

Seventh Annual Report of the State Entomologist of Colorado for the year 1915. Office of the State Entomologist, Circ. 19, 43 p.

The fruit-tree leaf roller was successfully controlled by the use of miscible oils whenever the work was thoroughly done.

689
1925 - Gillette, C.P. & Langford, G. S.
Control of some scale insects infesting Colorado trees and shrubs.
Colo. State Entomologist Circ. 46, 14 pp.
Miscible oils or lubricating oil emulsions are recommended for the scale insects. The lubricating oil emulsion formula is given. 2 gals. of red engine oil, soft water 1 gal. and 2 lbs. of liquid potash fishoil soap. These 3 are heated until the scum on surface begins to disappear. The mixture is removed from the fire and emulsified by pumping it into itself at least twice by means of a force pump. For use, dilute 1 gal. of stock to 16 gals. with water. This makes a 4% emulsion.

690
1915. Gillette, C. P. & List, G. M.

Insects and insecticides.
Colo.Agr.Expt.Sta.Bul.210, 59 pp.
The R & H formula is given. Pure kerosene and petroleum have been used as insecticides. Other sprays equally effective and much safer have taken their place. Soluble or miscible oils are used against scale insects and certain other insects that winter over in the egg stage in the winter. Only soft water should be used in any of the oil sprays.

691
Gillette, C. P., & Taylor, E.P.
1908.

A few Orchard plant lice.

Colorado Agric. Expt. Sta. Bul. 133, pp. 3-47.
The standard formula for mixing the stock solution of kerosene emulsion is as follows: Water 1 gal., soap 1/2 lb., kerosene 2 gals. For use dilute with water to secure the desired % of oil. Several commercial miscible oils diluted 1 gal to 50 gals. of water will make a 2% mixture, which in most cases should be strong enough to kill plant lice. Use for winter spraying only.

692
1910. Gillette, C. P. & Weldon, G. P.

Two plant lice of the peach.

Colo.Agr.Expt.Sta.Bul.169, pp.13-20.

Soluble oil may be used effectively for the control of the green peach aphis when applied in the early spring just as the eggs are hatching. Kerosene emulsion was of little value.

693
1 1[illegible]. Glenn, P. A.

The apple flea weevil.
Trans.Ill.Hort.Soc.,N.Ser., Vol.4[illegible], [illegible]-73.
Kerosene emulsion was used at 5,7-1[illegible],10 [illegible] 1[illegible]. The lower limbs of a tree were spr[illegible]. A canvas was placed beneath the tree to catch the weevils as they fell. The 5% spray was not strong enough to kill the weevils while the other dilutions were effective. Kerosene emulsion was tried after the beetles had left the trees and were in [illegible]. The ground was thoroughly watered. [illegible] began to come to the surface, the [illegible] with an 8% kerosene emulsion. [illegible] almost instantly.

694
1915 - Glenn, Pressley A.

The San Jose Scale .

28th Report of the State Entomologist of the State of Illinois, pp. 87-106.

Glenn, Pressley A.
See Univ. Illinois Agric. Expt. Sta. Circ. 180.

695
1915 - Glenn, Pressley, A.

The San Jose Scale.
Univ. Illinois Agr. Expt. Sta. Circ. 180, 24pp.
The socalled miscible oils are made of crude petroleum so treated as to remove some of the deleterious products and to cause it to mix readily with water. They are very effective scale destroyers, sometimes on account of their better penetrating qualities, a little more effective than lime-sulphur on trees that are heavily encrusted.

696
1915. Glenn, P.A.

The apple flea-weevil in Illinois, Orchestes canus.

Jour. Econ. Ent., vol. 8, no. 2, pp. 279-286.

P. 285. Kerosene emulsion. 5 o/o emulsion fairly effective; 7 o/o much better.

697
1923. Goco, A.

Insecticides for locust extermination.

Philippine Agric.Rev.,Vol.XVI,No.1,pp.49-54.

The following formula was used with success on locusts.- Resin 1.9%, sodium hydrate 0.25%, kerosene, 4.7%. The solution was applied in the evening when the locusts had crowded on the trees.

698
1885. Goff, E. S.

Insecticides.

N.Y.(Geneva)Agr.Expt.Sta.Rept.1884, pp.315-322.

Kerosene emulsion 1-8 was very effective for the turnip flea beetle and cabbage aphis.

699
1886. Goff, E. S.

Insects and insecticides.

New York (Geneva) Agr.Expt.Sta.Rept.1885, pp. 244-251.

Kerosene emulsion was not effective against the cabbage maggot.

1889-
Goff, E.S.

700
Report of Horticulturist, Experiments with Insecticides.
N.Y.State Expt.Sta. 7th Ann.Rpt. for 1888;pp.144-152
Kerosene in its pure state appears entirely harmless while it is fatal to others. Tests were made with it upon the foliage of the rose, grape, peach, currant, gooseberry, potato, tomato and pea, and the applications were repeated once a week on most of these plants for several consecutive weeks. The oil was sprayed with an atomizing bellows. The potato and tomato folig did not stand a single application; the gooseberry shriveled slightly under a copious spraying, but the rose, grape, peach and pear endured repeated sprgying without injury. Experiments were made to produce a kerosene and water mixture. An apparatus was made by using the atomizing bellows to spray both together. It was used on many plants in the greenhouse for the mealybugs and scale insects with excellent results; also for the aphis on apple and for the leaf hopper on the rose. It was effective for the insects but apple foliage was somewhat injured. In a single test for the potato beetle, it did not kill all of the insects.

701
1892. Goff, E. S.

Work in economic entomology.

Wisconsin Agr.Expt.Sta. Report for 1891, pp. 162-175.

The pump for making a mixture of kerosene and water is described. The mixture of kerosene with water is not injurious to foliage unless more than 10% kerosene is applied.

702
1894. Goff, E. S.

Work in economic entomology.
Wisconsin Agr.Expt.Sta.Rpt.1893,pp.253-261.
The kerosene spraying attachment for force pumps is given. The results from its use have been so successful that kerosene emulsion has been abandoned. Kerosene emulsion made by the Cook formula and a 10% mechanical mixture of kerosene and water were both successful in controlling the oyster shell scale.

703
1917 - Goodwin, W. H.

Grain bin sanitation.

Insects injurious to stored cereals prevented by cleaning bins.

Monthly Bull. Ohio Agri. Exp.Sta. Vol.II. No. 7, pp 223-224

After the bins are cleaned they should be sprayed with a 10% kerosene emulsion.

In this way eggs or insects which might be in the cracks and crevices are killed.

704
1919. Goodwin, W. H.

Japanese flower beetle.

Jour.Econ.Ent.Vol.12,No.3,pp.247-252.

Oil and oil combinations were tested in a small way as weed killers. Kerosene alone was ineffective, but a mixture of cheap lubricating or summer black oil, using equal parts or 2 -3 parts kerosene to 1 of black oil gave promising results.

705
1920. Goodwin, W. T.

Oil-spraying tests on apple trees.

Jour.Dept.Agric.New Zealand,Vol.21,No.2,p.78.

Tests were made with oil at strengths down to 1-4 without any injury to the apple trees. The San Jose scale was checked by the spray.

706
[illegible]. Gorgas, [illegible]

[illegible] of the Isthmian Canal.

The Jour.of Trop.Med. & Hygiene,Vol.XVII,pt.1 [illegible] Journal of the Assoc.of Military [illegible]

[illegible] could not [illegible] oil was used for the destruction of [illegible].

707
1900 - Gossard, H. A.

Some Common Florida Scales.
Florida Agr. Expt. Sta. Bul. 51, pp. 105-128.

Perhaps no substance has a wider range of usefulness than the preparations of kerosene in the form of emulsions, mechanical mixtures and soaps. While mechanical mixtures of kerosene and water have the advantage of being readily used, and perhaps, are more penetrating for insects like the armored scales, they have not been used extensively in Florida for the particular insects described in this bulletin.

708
1900 - Gossard, H. A.

Report of the Entomologist,
Florida Agr. Expt. Sta. Rpt. for 1899,-1900; pp.53-75

Crude petroleum 100% was sprayed on pear, plum and peach trees to test for tree injury. There was someinjury. All the trees were sprayed until they dripped, also 15 & 30% mechanical mixture of petroleum with water was put on plum and peach trees. No injury was detected from these applications. An application of kerosene 15% to 20% was made at the same time. Petroleum seemed to be more desirable. The bloom was not injured, though the bloom buds were swelling, and in some cases just ready to burst or actually opening, when the applications were made.

709
1901 - Gossard, H. A.

Report of the Entomologist.
Florida Agr. Expt. Sta. Rpt. 1901, pp. 58-75.

Crude petroleum for winter treatment and kerosene and water mixture for spring and summer treatment have given good results and are recommended for San Jose scale.

710
1901 - Gossard, H. A.

The Cottony Cushion Scale.

Florida Agricultural Experiment Sta., Bul. 56, pp. 309 - 356.

The scale may be exterminated by the use of kerosene applications. The standard kerosene emulsion may be used, or 15% of kerosene in a mechanical mixture with water. Such applications should not be used during the blooming period nor until thefruit is 1/4 grown.

1902-
Gossard, H. A.

711
Two Peach Scales.
Florida Agr. Expt.Sta. Bul. 61, pp. [illegible].
Crude petroleum (43-45° Be); applied in 20% mechanical mixture with water is an efficient winter remedy for both the San Jose and white peach scale. Trees in leaf in spring and summer should be sprayed with a 10 to 15% mixture of refined kerosene and water when the young are migrating.

712
1903 - Gossard, H. A.
White Fly.
Florida Agr. Expt.Sta. Bul. 67, pp. 595-666.
Kerosene used as an emulsion or in a 10% mechanical mixture is efficient for the larvae and eggs of the fly, but is somewhat uncertain in its effect upon the tree. The emulsion is much more reliable than the mechanical mixture. Crude petroleum should never be used on citrus trees.

713
1906 - Gossard, H.A.
Soluble oils as destroyers of San Jose scale.
Ohio. Agr.Expt.Sta.Circ. 60; 4 pp.
Results from the use of scalecide, target brand, san ie destroyer and kil-o-scale were far from being as satisfactory as lime sulphur. Sometimes the treatments were as good as lime sulphur, and again the treatments were total failures. The use of oils for San Jose scale is not highly recommended, except to the man with a few trees.

714
19[illegible] - Gossard, H. A.
Cutworms, their habits, characteristics and means of control.
Monthly Bull. Ohio Agri. Exp. Sta., Vol.II, No. 3, pp 85-90.
Kerosene may be sprayed on cutworms which have gathered in a burrow while migrating.

715
1917 - Gossard, H. A.
The Striped Cucumber Beetle
Monthly Bull. Ohio Agric. Exp. Sta, Vol.2, No. 4, 1917. pp 117-120.
One pt of kerosene mixed in 1 2 peck of lime and this mixture is added to 1/2 bu of lime. When dusted over the plants it acted as a repellent, in some cases. Kerosene emulsion (1-15, 1-18) [illegible] to be a successful repellent in some cases.

716
1920 - Gossard, H. A.
Watch for chinch bugs.
Method of constructing dust and tar barriers in farm fields.
Monthly Bull. Ohio. Agric. [illegible] No. 6, pp 178-179.
Chinch bugs in post holes should be killed by spraying with pure kerosene. When the bugs are congregated on the corn plants they should be sprayed with kerosene emulsion diluted with 8 to 10 parts of water.

717
1904 - Gossard, H. A., & Hume, H.Harold.
Insecticides & Fungicides.
Florida Agr.Expt.Sta.Bul. 76, pp. 201-250.
Kerosene emulsion is a very penetrating insecticide, one of the most efficient against all sucking insects. Formula: Whale oil soap, or hard soap(chipped) 1/2 lb., water 1 gal., kerosene 2 gals.(Made in usual way) For scale insects use 1-9, for plant lice dilute 1-18. For tender plants dilute 1-15 or 1-20. Kerosene sprays should not be allowed to collect about the base of trees or in the crowns of the plants. Spraying should be done on bright sunshiny breezy days. Kerosene milk emulsion: Kerosene 2 gals., milk (sour) 1 gal. Put together and churn by means of a pump. Mechanical mixtures of kerosene and water are useful in fighting San Jose and related scales. Crude petroleum having a specific gravity of from 43 to 45 degrees Be. when diluted with 75 to 80% water is excellent for scale insects, if applied during the winter months. Crude petroleum is to be preferred to kerosene for winter applications, because of the heavy nonvolatile oils which persists upon the bark for many weeks.

718
1910. Gough, L. H.
On spraying for froghoppers.
Dept.Agr.Trinidad, Circ. 5, 4 pp.
The R & H formula for making kerosene emulsion is given. The emulsion is used on sugar cane.

719
1898 - Gould, H. P.
Notes on spraying and on the San Jose scale.
N. Y. Cornell Univ. Agr. Exp. Sta., Bul. 144, pp 579-792
Two summer applications of kerosene and water diluted 1-4, held the San Jose scale in check on shrubs of cornus and pyrus. A few living scales were found in November. Then two more treatments were made using kerosene at the same strength. On examination in January about 90% of the scale were dead.

720
[illegible] - Gould, H. P.
[illegible] San Jose scale.
N.Y. Cornell Univ.Agr.Expt.Sta. bul. 155, [illegible]
[illegible] a mixture of kerosene & water stronger than 20% kerosene is injurious to peaches. Apple trees were not as susceptible to kerosene injury as peaches. Conflicting results [illegible] kerosene. Injury was least when kerosene was sprayed on bright sunny days. A 20% kerosene mixture (1 part oil to 4 [illegible] tive to insects, even the San Jose scale.

721
1901. Gould, H. P.
Kerosene for San Jose scale.
Amer.Gardening, Vol.XXII, No.323, p.151, March.2, 1901.
It is unsafe to spray peach trees with kerosene when they are perfectly dormant. After the sap begins to ascend in the spring there is little or no danger of serious injury from a 20% mechanical mixture of kerosene and water. Crude petroleum having a test of not less than 43° may be used while the trees are dormant instead of 20% kerosene.

722
1901. Gould, H. P.
Kerosene for San Jose scale.
Colman's Rural World, Vol.LIV, No.13, 27 March, 1901, p.99.
It is unsafe to spray peach trees with kerosene when they are dormant. After the sap begins to ascend there is little or no danger of serious injury from a 20% mixture of kerosene and water. Crude petroleum having a test of not less than 43° may be used while the trees are dormant instead of a 20% kerosene mixture.

723
1901 - Gould, H.P.
Suggestions About Combating the San Jose Scale
Md. Agr. Expt. Sta. Bul. 73, pp. 153-166.
See Supplementary abstract

724
1915. Gowdey, C. C.
Notes on a scale insect attacking cacao in Uganda.
Annals.App.Biol.Vol.I, No.3 & 4, pp.399-402.
Kerosene emulsion made by the R & H formula was the best remedy for scale insects on cacao.

725
1916. Gowdey, C. C.
Report of the entomologist.
Ann.Rept.Uganda Dept.Agric.for the year ending 31st March 1916, pp. [illegible].
Kerosene emulsion willcontrol the scale insects of coffee and the cacao aphis.

726
1917. Gowdey, C. C.
Report of the entomologist.
Ann.Rept.Uganda Dept.Agric.for the year ending 31st March, 1917, pp.32-37.
Kerosene emulsion will control the scale insects of cacao.

727
[illegible]

[illegible] Rept. of the Government Entomologist.

Uganda Dept.Agric.Ann.Rept. for the year [illegible] 31st March,1918, pp.42-51.

The following kerosene emulsion formula is [illegible]: Dissolve 1 qt. of soft soap in 2 qts. of [illegible], [illegible] 1 qt. of kerosene and emulsify. This [illegible] for use by adding an equal amount of [illegible].

728
[illegible] Gowdey, C. C.

The citrus black fly.

Jamaica Dept.Agric.,Ent.Circ.3,11 pp.

The following kerosene emulsion formula is [illegible] for use on the citrus black fly when diluted 1-[illegible]. Kerosene 1 gal.; hard soap, 10 ozs., water,1 [illegible]. This is emulsified by heating and pumping back and forth.

729
1922. Gowdey, C.C.

Control measures against the citrus black fly.

Jamaica Dept.Agric.,Ent.Circ. 6, 3 pp.

The following formula for making kerosene emulsion is given: 10 ozs. of hard soap is dissolved in one gal. of hot water and 1 gal. of kerosene is added; the whole is emulsified by pumping. For [illegible] citrus black fly this stock is diluted with 15 parts water.

730
1922. Gowdey, C.C.

The resuscitation of decadent citrus groves.

Jamaica Dept.Agric.,Ent.Circ.,7, 5 pp.

Kerosene emulsion is recommended for scale insects.

731
1914 - Graf, J.E.
A preliminary report of the sugar beet wireworm.

USDA Bur. of Ent. Bul. 123; 68 pp.

Kerosene and kerosene emulsion were not effective against the wireworms.

732
19[illegible] Graham, J.J.T.

Study of methods proposed for the determination of the unsulfonated residue in petroleum spray oils.

J. Assoc. Official Agr. Chem. 10, 124-30.

733
1916. Graham, S.A.

Notes on the Control of the White Pine Weevil.
Jour. Econ. Ent., vol. 9, no. 6, pp. 549-[illegible].

Kerosene emulsion (1 to 3) was painted on young pines. 50 o/o of treated trees were freed of weevils with considerable injury to the trees. Scalecide (1-25) freed 80 o/o of trees without tree injury.

734
1914. Graham-Smith, G. S.

Prevention and control of flies.
Flies in relation to diseases, 389 pp.
Cambridge, England, pp.249-256.
The use of kerosene in privies is strongly recommended, since it kills not only the eggs of parasitic intestinal worms, but fly larvae of all kinds.

735
[illegible] Gray, G.P. et al.

[illegible]

[illegible] Agr. Special P[illegible]

[illegible] kerosene, distillates, crude oils, etc. and are designed to lessen the injury to the trees which the [illegible] alone causes. The manufacturers do not depend on soap as emulsifier in mixtures of miscible oils and emulsions, but rely wholly on lime, bluestone or copper [illegible] to produce the desired product. Mixtures having copper, calcium and iron are known as "[illegible] Emulsions". They are of interest in sections where hard waters are used in making sprays. Soap emulsions are apt to be [illegible] by hard waters. These [illegible] are not [illegible] and are compatible with lime sulfur solutions. [illegible] are given of miscible oils and emulsions showing [illegible] ingredients, as oils, phenol, soap, [illegible] and [illegible] (other than [illegible] in soap), [illegible], water, etc.

736
[illegible]

[illegible] miscible oils.

[illegible] Agr. [illegible] Pub. 51, Nov. [illegible]

See Supplementary abstract

737
1925 Gray, Geo. P.

Taking the burn out of spray oil. Calif. Dept. Agric Weekly News Letter vol. 7, No. 16, (Aug. 8, 1925)

See Supplementary abstract

738
Gray, G. P. and De Ong, E. R.
1926. California Petroleum Insecticides. Laboratory and field tests.

Ind. & Eng. Chem. Vol. 18, No. 2,pp175-180.

See Supplementary abstract

739
1903. Gray, St. George.

Note on the use of kerosene as a culicide.
Jour.Trop.Med. Vol.VI,pp.313-4.
Kerosene is the best larvicide that can be used. Some authors claim that adults are killed while depositing their eggs on water coated with kerosene. Gray's observations showed that no adults were killed, and they were in no way deterred from depositing their eggs.

740
1909. Graybill, H.W.

Methods of exterminating the Texas fever tick.

U.S.D.A..Farmers' Bul.378, 30 pp.

Spraying is adapted for small herds. Kerosene with cotton seed oil in a half and half mixture or crude petroleum may be used in pumps for making mechanical mixtures. A 20% mixture of these may kill most of the ticks. Crude petroleum dips are used for large herds. This should be used only in warm weather. An emulsion of crude petroleum is best. This is made by using 1 lb. hard soap; soft water 1 gal.& 4 gals. of crude petroleum; a 20% solution is used for dipping.

741
1913. Graybill, H. W.

The action of arsenical dips in protecting cattle from infestation with ticks.
U.S.D.A.Bur.of Anim.Ind.Bull.167,27 pp.
Beaumont oil has a marked influence on oviposition, on the number of eggs deposited and the viability of the eggs.

742
1914. Graybill, H. W.

Repellents for protecting animals from the attacks of flies.

U.S.D.A. Bul.131, 26 pp.

Beaumont oil and 10% oil of tar were tried as a repellent. The same oil and 50% oil of tar were also tried, 50% oil of tar is dangerous to use. Their repellent action is very marked. Crude petroleum may be used pure, Kerosene emulsion has only a very slight repellent action. Formulas of other workers are given.

743
1915. Graybill, H.W.

Methods of exterminating the Texas-fever tick.

U.S.D.A.Farmers' Bull.498, 42 pp.

A revision of Farmers' Bulletin 378, 1909. The same oil dips are given.

744
1913. Graybill, H. W. & Lewallen, W. M.

The Biology or life history of the cattle tick as determined at Auburn, Ala.

Ala.Agr.Expt.Sta.Bul.171,pp.77-110.

The following oil emulsion formula is given: 1 lb.hard soap, 1 gal.soft water, 1 gal.crude petroleum. This is thoroly emulsified. Two gals. of water are added before using on the cattle.

745
1899. Green, E. E.

The "lantana bug".

Roy.Bot.Gardens,Ceylon,Circ.10, pp.83-94.

The R & H kerosene emulsion was recommended for this insect. For use, dilute 1-9 or 10. The emulsion should not be applied during sunshine, or serious injury to the plants may result.

746
1890 Green, E. Ernest

Insect Life, Vol.2, No.10, 1890, p.329

Kerosene against Tea Aphis on tea

747
1925. Green, E. L.

Factors influencing the selection of oil sprays.,

Washington Col. Agri. Exp. Sta. Bul.196, pp 17-18,

From the laboratory and field studies of the oils, the following conclusions are drawn. There is no important difference in the killing rate of oils of similar boiling range from petroleum stock of asphalt and paraffin bases. The middle of the lubricating oil fraction seems the most effective. The viscosity of an oil seems to have only an incidental relation to its insectididal effect and,therefore,little benefit can be expected from the addition of kerosene to a lubricating oil before making it an oil spray. The oils used this year were all samples that had been subjected to practically none of the processes known as refining. These seem to be unnecessary for this purpose.

748
1923. Green, F. J.

How to combat injurious insects.

Qtrly.Jl.Forestry,Vol.XVII,No.4,p.208-224.

The following formula for a kerosene quassia emulsion is given: 6 gals. of boiling water thoroly stirred while adding 10 lbs. soft soap and 1 gal. of kerosene. 6 lbs. of quassia chips should be boiled and after straining, the liquid should be added to the above. The entire mixture is diluted with 90 to 100 gals. before using.

749
Green, Howard Whipple

1924. The effect of oil upon Anopheles mosquito larvae

Amer. Jour. Hygene Vol. 4, No. 1 pp.12-22.

See Supplementary abstract

750
1890. Gregorson, D.

Scale insects in California.

Insect Life,Vol.III,No.4, p.168-169.

Kerosene emulsion had little effect on the scales.

751
1905. Greiner, T.

New kerosene emulsions.

Farm & Fireside,Vol.XXVIII,No.23,p.2,Sept.1, 1905.

The K-L emulsion of Del.Agr.Expt.Sta.is given.

752
[illegible]

[illegible]

[illegible]

S ee Supplementary abstract

753
1916. Gunn, D.

The [illegible] tree caterpillar.

Union of S. Africa, Dept.Agric.,Pretoria,Div. Entom.Pubn. [illegible]

[illegible] ting the larvae in a vessel with a small quantity of kerosene and water.

754
191[illegible]. Gunn, D.

Some [illegible] fruit and flower beetles.

Union of South Africa.Dept.Agric.,Pretoria, Div.Entom.Pubn. [illegible]

The captured beetles are placed in a vessel with kerosene and water.

755
1913. Gunn, D.

The bagrada bug.

Union S. Africa Dept.Agric.,Bull.[illegible]

Miscible [illegible] moving about on the soil. These oils should not be [illegible] the infested plants.

756
1919. Gunn, D.

The fig and willow borer.

Union S. Africa,Dept. Agric. Bull. 6, 22 pp.

Gargoyle red spray oil and Harbas spray oil used at 1-40 as a repellent were not effective. No injury was noted.

757
1923 Gurney, W. B.

Insect pests of the present season.

Agric. Gaz. N.S.W., Vol. XXXIV, Pt. 12, pp 905-907,

Equal parts of soap suds and kerosene emulsified and added to a tobacco concoction may be used to advantage on thrips.

758
1924 - Gurney, W.B.

Insect pests of the present season.

Agric. Gaz. N.S.W.,Vol. XXXV,Pt. 1, pp.69-71

Kerosene emulsion should be sprayed on the Rutherglen bug.

759
1924, Gurney, W. B.

To control cabbage moth

Agric. Gaz. N.S.W.,Vol.XXXV Pt. 5, p. 325

To keep cabbage plants free of cabbage moth persistant spraying in the seed beds and later in the field with kerosene emulsion is necessary.

760
1924. Gurney, W.B. and Brereton, W. le Gay

The green peach aphis and its control.

Agric.Gaz.of N.S.W.,Vol.35,No.9,p.667-8.

The control consists of 1 gal. of miscible oil with an adequate quantity of washing soda added to produce a thoro emulsion, to 25 gals. of water. This should be applied late in the winter or early in the spring.

761
1908, Gurney, Wm. G.

Notes on grasshopper swarms in N.S.W.during 1907-8.

Agric.Gaz.of N.S.W.,Vol.19,No.5,p.411-19.

Kerosene emulsion was very effective on the younger stages of the grasshoppers,but the older ones recovered from the effect of the spray. The following formula is given: 1 gal.kerosene and 2 lbs.soap emulsified in two or three gals. of water. 7 or 8 gals. of water are added before using.

1909, Gurney, Wm. G

762 Cherry Tree Borer,

Agr. Gaz. of N. S. Wales, Vol. 20, No. 8, p 772.

Blue, red, kerosene or other oils, squirted into the channels of the borers is effective.

763
1910. Gurney, W. B.

Experiments with red oil and kerosene emulsions against woolly aphis.

Agric.Gaz.of N.S.W.Vol.21,No.8,p.697-8.

The following red oil emulsion formula is given: 1 gal.oil, 1/2 lb.soap,10 gals.water. The oil adhered well, The trees were not burned by the spray. Kerosene emulsion 1-10 was also used. This was almost as effective as the red oil 1-10 in destroying the woolly aphis where it touched them, a 1-20 kerosene emulsion was not effective. This spray evaporated very quickly. Red oil remains and spreads long after the kerosene has disappeared.

1897, Guthrie, F.B.

764 Notes on some chemical points in the preparation of insecticides and fungicides.

Agr. Gaz. N.S.W. Vol. 8,No.10, pp 707-715

A true kerosene emulsion can only be made by thorough agitation. If unemulsified oil remains, more boiling soap suds should be added and agitated again. Free oil destroys foliage.

765

Hacker, H. P
1925. How oil Kills Anophiline Larvae.

F.M.S. Malaria Bureau Reports. Vol. 3, 62 p. (London)

See Supplementary abstract

766
1914, Hadlington, J.

The fowl tick

Agric. Gaz. N. S. W., Vol.XXV, Pt. 4, pp 345-349

Spraying the poultry houses with kerosene emulsion is the best remedy for the poultry tick, 8 oz of soap is dissolved in 1 gal of boiling water and 1 gal of kerosene is stirred into the soap and water solution. Ten gals of soft water are then added before using.

1917 Hadlington, J.
767

Poultry Notes

Agric. Gaz. N.S.W., Vol.XXVII, No. 9, pp 671-673.

The best method of ridding poultry houses of vermin is to spray them with kerosene emulsion. To make the stock emulsion 8 oz of soft soap is dissolved in 1 gal. of boiling water and then add 1 gal kerosene, stirring all the time. Add to this stock 10 gals of water before using.

1918 Hadlington, J.
768

The fowl tick

Agric. Gaz. N.S.W., Vol.XXIX, No. 12, pp. 892-896

The poultry houses should be sprayed thoroughly with kerosene emulsion. The following formula for making the emulsion is given; 8 ozs of soft soap is dissolved in 1 gal of boiling water, 1 gal of kerosene is added and the whole completely emulsified by stirring.

769
1923. Hadlington, J.

Poultry Notes.

Agric.Gaz.of N.S.W.Vol.34,No.11,p.832-5.

The following kerosene formula is given: 1 gal.soft water, 8 oz. soft soap and 1 gal.kerosene. This is diluted to 10 gals. with soft water. The fowl house is thoroly sprayed with this spray.

770
1916. Hall, B.

Paraffin for lousiness.

British medical Jour.Vol.1,1916,No.2893,p.837.

Kerosene oil swashed over the skin from neck to heels was an effective and easily applied remedy for pediculosis.

771
1920. Hall, W. J.

Report on a preliminary campaign against the hibiscus mealy bug in the Cairo Nursery Gardens.

Agric. Jl.Egypt,Vol.X, pp. 1-6.

The R & H formula is given.

772
1921. Hall, W. J.

The hibiscus mealy bug.

Egypt Minister Agric.?Cairo,Technical & Scientific Service, Entomological Section,Bull. 17,28 pp.

Paraffin emulsion was most effective when diluted 1-10 to 1-15, using 1 lb. of sunlight soap to insure wetting. The emulsion was made by the following formula: Paraffin, 2 gals.; water, 1 gal.; hard soap (Sunlight), 1/2 lb.

773
1922. Hall, W. J.

The hibiscus mealy bug.

Bull. Soc. Ent.d'Egypte,Cairo,Annee.XIV, 12 Jany.1921,pp.17-29.

Spraying with paraffin emulsion is effective but it must be accompanied by pruning.

774
1922. Hall, W. J.

The outbreak of Pseudococcus sacchari, Ckll.,on the sugar cane of Egypt.

Minister of Agric.Cairo, Technical and Scientific Service, Bul. 26 (Ent.Sect.) 16 pp.

The sugar cane "sets" may be freed of this insect by dipping in a paraffin emulsion diluted 1-30. The formula for paraffin emulsion is: Paraffin or petroleum, 2 gals.; water, 1 gal.; sunlight soap,1 lb.

775
1918 - Hallingan, C. P. & Pettit, R.H.

Spray and practice outline for fruit growers.

Mich. Agr.Coll. Expt.Sta. Special Bul. 86; 24 pp.

Eustace, H. J. and Pettit, R. H.
Same as special bulletin 54 of this station.

776
1916 - Halpin, J. G. & Hayes, J.B.

Fight poultry lice and mites.

Wisc. Coll. Agric. Extension Service, Circ. 56, revd. April 1922. 8 pp.

Spraying with kerosene or crude oil will kill the mites in poultry houses.

777
1903. Halsted, B. D. & Kelsey, J. A.

Report of the botanist.

New Jersey Agr.Expt.Sta.Rpt.1902, pp.377-422.

Kerosene emulsion made by the following formula, kerosene 2 pts., hard soap, 2 ozs., water 8 gals., was used as a fungicide for mildewed plants. The results were not entirely satisfactory.

778
1903 - Halsted, Byron D. & Kelsey, James A.

Some of the newer fungicides.
New Jersey Agr. Expt.Stas. Bul. 167, 15 pp.

Tests with kerosene emulsion as a fungicide extended over 3 years. This kerosene emulsion was made by the following formula. 1 oz. of ivory soap was dissolved in 1 gal. of boiling water and after removing from the fire 2 pints of kerosene was added. It was pumped into itself for 10 minutes. Then 7 gals. more water was added and the spray was ready for use. An atomizer was used for applying the emulsion. In 1901 cucumbers and Swiss chard were sprayed three times.

There was no checking of the blight and the plants remained unharmed. The emulsion was successful on verbenas for mildew. Lilac mildew was not checked when sprayed with the emulsion. In 1902 phlox and verbena were used. Here the emulsion was successful in checking the mildew. The experiments of 1902 were repeated in 1903 with the same results.

779
1924 - Hamilton, C. C.

Control of the European Red Mite.
Maryland Agric. Expt. Sta. Bul. 264, pp. 181-238.

See Supplementary abstract

780
1909 Hammar, A. G.
The cigar case-bearer.

USDA Bur. Ent. Bul. 80. pt. 2, pp. 33-44.

This insect can be controlled with either a kerosene emulsion or a Paris green spray applied in the early spring before and while the leaf buds are opening.

781
Hamor, W.A. and Padgett, F.W. The technical examination of crude petroleum, petroleum products and natural gas. New York, McGraw-Hill Book Co., Inc. 1920. 572 pp.

A manual prepared for use of students of hydrocarbon chemistry and petroleum engineering, being arranged with a view to use as a laboratory companion to "The American Petroleum Industry", by Bacon and Hamor.

782
1911 Hardenberg, C. B.

San Jose scale in the Transvaal
Agric. Jour. of the U. South Africa, Vol.2, No. 3, P 256-263

Pure kerosene oil, if applied in a fine misty spray can be safely used during the dormant season on apples, pears and quinces. Peaches cannot be sprayed with a mixture of 20% kerosene and water which is not strong enough to kill the scale.

783
1907, Hardenburg, C.B & Malde, O.G.

Report on the study of insects injurious to cranberries during the summer of 1907.

24th Ann. Rept. Wisconsin. Agr. Exp. Sta., for 1907, pp 309-320.

Kerosene may be used for the second brood of fire worm eggs. The area is flooded and the kerosene placed in a film on the water and the water is drawn off so that the receding film of oil would be left on the eggs.

784
1922. Hargreaves, H.

1921. Annual Report of the Government Entomologist,

Uganda Dept.Agric.Ann.Rept., 1921, pp.57-64.

7% kerosene emulsion is recommended for thrips on coffee.

785
Harper, D. N.

1888 Insecticides and Fungicides on Potatoes
Minnesota Agr.Expt.Sta.Ann.Rept. for 1888, pp.203-208

Kerosene emulsion is an excellent remedy for destroying wooly aphis and the currant worm and some other insects. To 1 part soft soap add 2 parts kerosene and stir or churn until they unite and form a homogeneous compound. This may be used 1 pint to 6 gals. of water, and should be sprinkled or syringed over the plant. By mistake it was applied to potatoes full strength, but while the emulsion was strong enough to burn the vines the potato bugs did not appear to experience any inconvenience.

786
1916. Harrison, J. B., Bancroft, C.K. & Bodkin, G.E.

The cultivation of limes, III.

Jl.Bd.Agric.British Guiana, Vol.IX, No.3, pp.122-129.

The R & H formula for kerosene emulsion is given.

787
1918. Hartley, J. A.

Notes on an outbreak of Phlebotomus fever.

Jl.R.A.M.C., London, Vol.XXXI, No.4, pp.317-318.

Kerosene oil was used on the breeding places of the sand flies.

788
1921. Hartley, R. N.

The auricula and woolly aphis.

Gardeners' Chron, Vol.LXIX, No.1787, ~~No.1787~~, 26th March 1921, p.152.

The pots where the auricula have grown are scrubbed out with paraffin and soft soap mixture, 1-30 in hot water.

789
1893 - Harvey, F. L.

Report of the Entomologist.
Maine Agr. Expt. Sta. Rpt. 1893; pp. 159-180.

For the apple leaf Bucculatrix apply kerosene emulsion in winter to the branches that bear the cocoons. The same application might be made for the first brood when the tree is in foliage. Kerosene emulsion is also suggested for white grubs.

790
1895 - Harvey, F. L.

Report of the Entomologist.
Maine State Coll. Agr. Expt. Sta. Rpt. 1894, pp. 104-123.

Kerosene emulsion is recommended for the chinch bug by spraying the infested grass. Benzine when properly applied has been found to be the most convenient and best remedy for the Buffalo carpet beetle.

791
1899 - Harvey F. L. & Munson, W.M.

Apple Insects of Maine.
Maine Agri. Expt. Sta. Bul. 56, pp. 107 - 144.

Kerosene emulsion is recommended for the following insects: Wooly aphis, apple tree aphis, apple-leaf bucculatrix. For the latter apply in winter to branches that bear cocoons and to trees in foliage for the first brood.

792
1912 - Haseman, L.

The San Jose scale in Missouri.
Missouri Agric. Expt.Sta. Bul. 98, pp. 61-116.

Among the oil washes are a number of proprietary preparations such as scalecide, Target brand scale destroyer, Killoscale and Soluble oil 95%. These were tested in 1908 and found to be entirely effective when applied at sufficient strength. Kerosene emulsion at a strength of 16 to 20% was equally as good. To make kerosene emulsion dissolve 4 lbs. of laundry or homemade soap by boiling in 5 gals. of water. Add the boiling suds to 8 or 10 gals. of kerosene in a spray barrel and agitate the mixture vigorously by pumping it back into itself several minutes. To this add water to make 50 gals. A thorough spraying in fall and spring with a 16-2/3 % kerosene emulsion or of one of the miscible oils at 1-15 will control the San Jose scale in any orchard.

793

1915 - Haseman, L.

Control of the San Jose scale in Missouri.
Missouri Agr.Expt.Sta. Bul. 132, 9 pp.

A homemade oil emulsion can be made very simply by boiling 2 pounds of hard soap in 4 gals. of water until all is dissolved. Then pour the four gal. boiling suds into the spray barrel containing between 8 & 10 Gals. coal oil. Agitate by pumping the solution thru' the nozzle back into the barrel until the oil is thoroly broken so that it will not separate on cooling. Then add enuf water to make 50 gals. before applying. If a standard commercial miscible oil is used it should be diluted at the rate of 1 gal. solution to from 12 to 15 gals. of water

In the control of the scale thoro application is most important since the scale must be touched if it is to be destroyed.

794

1925, Haseman L, et. al.

Entomology, Missouri Agr. Exp.Sta.Bul.228, pp. 47-52.

Lubricating oil emulsions have been used as a dormant spray for the control of the San Jose scale with a high degree of success.

795

1923 - Haseman, L., & Sullivan, K.C.

Contolling San Jose scale with lubricating oil emulsion.

Missouri Agric. Expt. Sta. Circ. 109.

See Supplementary abstract

796

1921 - Haseman, L., Sullivan, K.C., and McBride, O.C.

Studies of insects injurious to nursery stock.
Missouri Agric.Expt.Sta.Bul. 189, pp. 37-38.

The best method for controlling San Jose scale seems to be by dipping the nursery stock in miscible oil diluted 1-12 or 1-15. In every case this treatment killed from 99 to 100% of the scale.

797

1909. Hayhurst, P.

The San Jose scale and how to control it.

Ark.Agr.Expt.Sta.Bul.107,pp.367-394.

Miscible oils are recommended for use against the scale. The R & H formula is given. Kerosene emulsion was used as a summer spray; 15% for apples and pears; 10 % for peaches, plums and all other stone fruits.

798

1908. Headlee, T. J. & Dean, G. A.

The mound-building prairie ant.

Kans.Agr.Expt.Sta.Bul.154, pp.165-180.

Kerosene poured into the nests was not effective.

799

1913 - Headlee, T.J.

Report of the Entomologist.
N.J. Agr.Coll.Expt.Sta. Rpt. 1912, pp.419-454

Scalecide was tried on greenhouse plants 1-40, 1-20, 1-10 1-8; also 1-30. Target brand 1-10 and 1-20; Kerosene emulsion 1-3, 1-5 & 1-6. Palms infested chiefly by Chrysomphalus dictyospermi Morgan were treated. The oils remained for several days. Injury from kerosene emulsion did not take place until 16 days; only two plants stood Scalecide 1-20 without injury. All killed the larvae and recent sets.

800

19[illegible]. Headlee, Thomas J.

Anti-Mosquito Work in New Jersey.

Jour.Econ. Ent., vol. 7, no. 3, pp. 260-26[illegible]

Oiling of breeding places which cannot be eliminated, is recommended.

801

1923. Hearle, E.

Mosquito control at Banff, Alberta.

Agric. Gaz.Canada,Vol.X,No.3,pp.218-220.

Kerosene was used for dealing with the mosquito pest. Owing to the cold nights a heavier oil could not be used.

802

1895. Heaton, S.

Turnip gall-weevil.

Gardner's Chronicle 3rd ser. Vol.17, No. 431, p.398.

Weevil larvae immersed in kerosene oil lived for more than 10 days.

803

1898 - Hedrick, U.P.

Orchard Pests.
Utah Agr. Coll. Ext. Sta. Bul. 55, pp. 152-168.

The R & H formula for kerosene emulsion is given.

804

1903. Hempel, Adolph.

Notas sobre experiencias feitas contra e pulgao da roseira.

Boletim da Agricultura. Sao Paulo (4a Ser), No. 12, pp.558-9.

Rose bushes infested with Siphonophera rosae Reaumur were sprayed with kerosene emulsion containing 5% by volume of oil with sufficient soap to emulsify it.

805

1908 - Henderson, L. F.

Spraying Experiments - 1907.
Idaho Agric. Expt. Sta. Bul. 61, 15 pp.

Scalecide was tried with a number of other sprays. It was used 1-20 and 1-15. 1-20 does not kill enough scale. At 1-15 it kills scale as well as any other spray is pleasant to handle, covers the tree quickly with an oily coating and mixes easily.

806

1924. Hendrickson, A.H.

Prune Growing in California.

Calif. Agr. Expt. Sta. Berkeley. Bull.328,

The Italian Pear scale is controlled by 12% crude oil emulsion. The Brown Apricot scale is controlled with a 5% distillate emulsion, a miscible oil, or a 12% crude oil emulsion.

807

1920. Henry, A.

Chermes attacking Douglas fir.

Gardener's Chronicle, London,LXVII, No.1748, 26th June,1920, p.318.

Kerosene emulsion has been found effective against the chermes in nurseries.

808

1919. Henry, A. K.

Destruction of mosquito larvae in streams. A thorough and economic method.

Lancet, London,Vol.CXCVI,No.4995.24th May, 1919, pp.908-909.

Kerosene is used on ponds for the destruction of mosquito larvae.

809

1891. Henry, W. A.

Kerosene emulsion successful against the chinch bug.

Insect Life,Vol.4,Nos.3 & 4, p.141.

Kerosene emulsion diluted 1-10 applied every second or third day was used with success against the chinch bug.

810

1924. Herbert, F.B.

Spray Stimulation.

Jour. Econ. Ent., vol. 17, no. 5, pp. [illegible].

See typed abstract.

See Supplementary abstract

811
1920. Herbert, F.B.

Cypress bark scale.
U.S.D.A. Bull.838, 22 pp.
Crude oil emulsion with a low-gravity oil was unsatisfactory. A distillate oil emulsion was next used, being of a higher gravity, but did not kill more than 40% of the scales. Miscible oil No. 1, being about 28° Baume was quite satisfactory when used at 12-1/2% strength. Miscible oil No. 2 having a gravity of 33° Baume, was tried. A 12-1/2 % solution was highly satisfact...

812
1924. Herbert, F.B.

The European elm scale in the west.
U.S.D.A. Bull.1223, 20 pp.
Sprays of distillate emulsion, kerosene emulsion or crude oil emulsion at strengths varying from 3 to 5 parts water to 1 part emulsion proved entirely unsatisfactory for the control of the European elm scale. Miscible oil sprays proved better. Those containing 28° Be oil were found to be satisfactory whereas those containing 33° Be gave very poor results. Miscible oil 28° Be. 1-12 is recommended.

813
1901. Herrera, A. L.

The mosquito Plague in the City of Mexico in 1901.
Mem. y Rev. Soc.Cient. "Antonio Alzante", Vol.16, No. 5-6, pp.207-228.
The use of kerosene during a mosquito outbreak in Mexico City is described.

814
1903. Herrera, A. L.

Jabón blande, negro, verde ó de potasa.

Comision de Parasitologia Agricola Circ.2,3 pp.

The following mixture is used to kill grasshoppers: Boiling water 1500 parts, black soap, 400 parts, kerosene 1000 parts. Dilute with 8-15 vols. of water according to the resistance of the plants. If kerosene is not available, crude petroleum may be used with precaution.

1915, Herrick, A. W.

815
Additional data concerning the control of the fruit-tree leaf-roller in New York.

Jour. Econ. Ent. Vol. 8, No 2,Pp 180-184
Scalecide and orchard brand miscible oils were used 1-15 on the eggs of the leaf roller. Very good results were obtained. The miscible oils are not completely relied on for the control of this insect.

816
1900 - Herrick, G. W.

Report of the Botanist and Entomologist.
Mississippi Expt. Sta. Rpt. 1900 - pp. 40-42.
Kerosene and water mixture was used on cattle for horn flies. 10% mixture was first tried but a 15% mixture was found to be better and perfectly harmless to cattle.

817
1901 - Herrick, G. W.

Report of the Botanist and Entomologist.
Miss. Expt. Sta. Rpt. 1901 - pp. 26-28.
Experiments were continued with kerosene and water mixture for horn flies on cattle; 20% and 25% were effective in killing flies. Even a higher percent than this can be used without any deleterious effect on cattle. For milch cows that come to the stable twice a day, 25% kerosene and water is a very effective and economical remedy. Kerosene and water evaporates very rapidly. Crude petroleum was tried and it was found that it could be used at full strength without injuring cattle, and that it remains on the body from 2 to 4 days. It was effective in killing flies 50% strength will kill flies and did not evaporate quickly.

818
1901 - Herrick. G. W.

Some Mosquitoes of Mississippi and how to deal with them.
Miss. Agr. Expt. Sta. Bul. 74; 31 pp.
If oil is poured on the surface of water it sooner or later spreads evenly over the surface in a film. As the larvae and pupae of the mosquito come up beneath the oil film to obtain air they are unable to push their tubes thru the oil and thus are completely shut off from the air and in a short time drown from suffocation. It may be that the oil as it comes in contact with the respiratory tubes produces injury which hastens death. Eggs lying on the surface that are touched by the oil are destroyed. The adult female mosquito

819
1902. Herrick, G. W.

The chicken mite.

Miss.Agr.Expt.Sta.Bul.78, 13 pp.

Crude petroleum is a quick and efficient remedy for the chicken mite. Before setting a hen the nest boxes should be treated with a coat of crude petroleum or kerosene.

820
1905 - Herrick, G. W.

The San Jose scale in Mississippi and the lime-salt sulphur wash.
Miss. Agric. Expt. Sta. Bul. 90, 15 pp.
The best substance for combating the scale in summer is kerosene emulsion made by the following formula. Dissolve 2 lbs. hard or soft soap in 4 gals. of boiling water; add 8 gals. of kerosene oil to the spray barrel then pour the boiling soap and water into the oil. Pump the mixture into itself for 10 or 15 min. Then add water to make 80 gals. This will give a 10% solution for summer use. Most effective if applied when the insects are breeding and the young are crawling.

821
1906 - Herrick, G. W.

Insects and diseases liable to be introduced into Mississippi.
Miss. Agr. Expt. Sta. Bul. 96, 16 pp.

Kerosene emulsion formula is given. Same as in Bul. 90 of this station.

822
1907 - Herrick, G. W.

How to control injurious insects and noxious plant diseases.
Miss. Agric. Expt. Sta. Bul. 102, 14 pp.
Method for making kerosene emulsion is the same as given in Bul. 90 of this station. The milk kerosene emulsion is made by using 1 gal of milk in 2 gals. of kerosene. After these are thoroly mixed they should be diluted with 17 gals. of water. This is a good remedy for plant lice.

823
1916. Herrick, G. W.

The fruit tree leaf roller in New York State.

Canadian Hort.,Vol.XXXIX, No.12,pp.287-288.

Miscible oils are very effective in destroying the eggs of the leaf roller.

824
[illegible]

[illegible]

[illegible]

[illegible] serious.

825
1915 - Herrick, G. W., &Leiby, R.W.

The fruit-tree leaf leaf-roller
N.Y. Cornell Univ. Agr. Expt.Sta., Bul. 307,pp 247-279.

The eggs of the leaf-roller were prevented from hatching by spraying with miscible oils before the buds burse. These oils were applied at a dilution of 1-15. No injury resulted from their use.

826
1914. Hewitt, C. Gordon.

Further observations on breeding habits and Control of the house fly, Musca domestica.

Jour. Econ. Ent. vol. 7, no. 3, pp. 281-293.

Kerosene emulsion, the most efficient of several preparations for treating manure.

827
1911. Hewitt, J.L. & Hayhurst, P.

Diseases of apple trees and fruit caused by fungi and insects.

Ark.Agr.Expt.Sta.Bul.109,pp.411-445.

15% kerosene emulsion is recommended for the woolly aphis.

[illegible] [illegible]

[illegible] New York.

American Jl. Public Health, Vol. VII, No. 7, pp. [illegible].

Kerosene is the cheapest vermicide that can be used as well as the most efficient.

829
1921. Hildebrand, S. F.

On the occurrence of Aedes sollicitans in fresh water polluted by acid waste.

Science, Vol. LIII, No. 1364, p. 163.

The larvae occurred most frequently along the edges of ditches among decaying vegetation and they displayed a stronger resistance to the toxicity of oil than culex and anopheles larvae occurring in the more weakly polluted portions of the same ditches.

1915 - Hill, G. F.
830 Insect pests of plants.
Northern territory of Australia
Dept. External Affairs Melbourne, Northern Territory Bull. No. 13, 16 pp

Kerosene emulsion was made by the R & H formula. It was recommended for the pumpkin bug 1-10; oriental scale 1-7; Red scale of orange; Brown scale: cottony cushion scale.

831
1890 - Hillman, F.H.

Plant lice infesting the apple.
Nevada Agr. Expt. Sta. Bul. 11; 7 pp.

Kerosene emulsion: formed by adding to 1 part of a boiled mixture of ½ lb. common soap and 1 gal. of water, 2 parts of kerosene, thoroly mixing, and diluting with cold water to form 15 to 20 parts, is efficient remedy.

832
1892 - Hillman, F.H.

The wooly aphis of the apple.
Nevada Agr. Expt. Sta. Bul. 17, 8 pp.
Hillman, F.H.
Kerosene emulsion. See Bul. 11 of this station.

833
1895 - Hillman, F.H.

An important elm insect.
Nevada Agr. Expt. Sta. Bul. 28; 8 pp.
Kerosene emulsion seems to be an effectual remedy when the insect is reached by it. From 60 to 80% of the lice were estimated as killed by one application.

834
1897. Hillman, F. H.

Some common injurious insects of Western Nevada.

Nevada Agr. Expt. Sta. Bul. 36, 39 pp.

1/16 oz. of buhach or white hellebore with each gallon of kerosene emulsion was found to be destructive to the imported cabbage butterfly larvae. Cabbage lice were also killed by this mixture. Kerosene emulsion alone was not effective on the larvae.

835
Hinds, W.E.

Cucumber and Canteloupe Insect Control.

Alabama Expt Sta., Auburn, [illegible] Service Leaf No. 1[illegible].

Melon Plant Louse. Under-spraying with kerosene emulsion.

836
1907. Hodgkiss, H. E.

Effects of sprays on aphis eggs.
U.S.D.A. Bur. Ent. Bul. 67, pp. 29-31.
The sprays used were kerosene, kerosene emulsion, crude oil, scalecide, kilo-scale, K-L mixture & kerosene whitewash. Results of the last two tests were as follows: Fourth Expt. Less than 1% of the eggs hatched on trees sprayed with crude oil & kerosene whitewash, Scalecide 8.9%; kerosene 6.7%; kerosene emulsion 7.6%; kiloscale 26%. Fifth Expt: No eggs hatched on tree that received the kerosene whitewash spray. Scalecide 40% hatch; kerosene 1.5%; kerosene emulsion 6%; kilo-scale 4%; crude oil 10%. Checks were 22.4 and 31.4% hatch.

837
1914 - Hodgkiss, H. E.

Susceptibility to Spraying Mixtures of Hibernating pear Psylla adults and their eggs.
N. Y. State Agric. Expt. Sta. Bul. 387, pp. 389-418.

Miscible oil, diluted 1-10 was effective against the psylla adult, while the homemade oil emulsions were less effective. The miscible oils and homemade oil emulsions were of no value for the destruction of the eggs.

838
1905 - Hodgkiss, H.E., Sirrine, F.A., & Baker, E.L.

Spraying for San Jose Scale.
N. Y. State Agr. Expt. Sta. Bull. 273; pp. 473-500.

Experiments with kerosene-lime mixtures showed this was to give variable results upon trees and scales. Probably the chief reason for the varying results on scales is the imperfect distribution of the emulsified lime oil portion in the mixture. Methods of determining kerosene in kerosene lime mixture are given (See E.L. Baker, 1905). Results of spraying with Scalecide during the dormant season showed a great retardation of the buds. The retardation attending applications of 5 and 10% scalecide were not important but with 15% oil was severe. In some cases the treatment seemed to promote the growth of better foliage. Summer spraying caused severe injuries. 3% scalecide had no effect on the scale. 5 & 10% oil seemed to destroy 80 to 95% of the scale while the 15% entirely controlled the scale.

839
Hoerner, J.L
1929. A progress report on the testing of sulfonated oxidation products of petroleum for their insecticidal properties.
Md. Sta. Bul. 310, pp 449-465.

840
1921 - Holland, E. B., Bourne, A. I., & Anderson, P. J.

Insecticides and Fungicides.

Mass. Agric. Expt. Stat. Bull. 201, 37 pp.

Oil sprays owe their insecticidal value chiefly to their asphyxiating effect. To a certain degree some of them may also have a corrosive effect. They also possess a peculiar creeping power which enables an operator to cover a tree even under unfavorable conditions. An insect to be killed must be actually hit. These oils will be considered as (1) emulsion and (2) miscible oils. Formula for making kerosene emulsion: Dissolve ½ lb. soap in 1 gal. boiling water, add 2 gal. kerosene. The mixture is then churned until it has the consistency of cream. For spraying, dilute with 9-10 parts water for aphids or other soft bodied insects. Greater strengths are sometimes used for resistant insects or on trees when dormant. Kerosene emulsion cannot be used safely in combination with other sprays (lead arsenate, lime sulphur, etc.) owing to the breakdown of these materials in the presence of soap, and the consequent liberation of free oil as well as other products of this double decomposition, which are dangerous to plants. Miscible oils are formed from a mineral oil emulsified with a vegetable oil, with some alkali present. This mixes readily with water. These are especially adapted for old, rough barked trees heavily encrusted with scale, as the oils spread over the bark very readily. For dormant spraying these oils are diluted at the rate of 1 gal. to 12-15 parts of water. The use of these oils had sometimes been followed by distinct injury.

841

Holmes, H.N. and Cameron, D.H. Chromatic emulsions. Jour. Am. Chem. Soc., vol. 44, Jan. 1922, pp. 71-74. Discusses the preparation of transparent emulsions and emulsions with structural colors.

842
1904. Holstein, Otto.

Blister beetles attracted to lights.

U.S.D.A. Div. Ent. Bul. 38. p. 109.

A light was placed above a basin of water upon which a film of oil was floated to prevent the escape of the beetles.

843
1907 - Hooker, W. A.
The tobacco thrips, a new and destructive enemy of shade-grown tobacco.

USDA Bur. of Ent. Bul. 65; 24 pp.

Kerosene emulsion made by the R & H formula proved satisfactory in killing the thips when diluted 1-10.

844 19?? Hooker, W.A.

U.S.Dept.Agr. Bur.Ent. Bul. 67, p. 110

Kerosene against Cutworms and Wire Worms.
Host: Tobacco plants

844a 1906 - Hooker, W. A.
The tobacco thrips and remedies to prevent "White Veins" in wrapper tobacco.
U.S.D.A. Bur. Ent. Circ. 68; 5 pp.

The R & H. Formula for kerosene emulsion is given. A 1-10 dilution of this stock was found effective.

845 Hooker, W.A. et al.
1912?
U.S. Dept. Agr. Bur. Ent. Bul. 106,

Kerosene and lard(p.204) against the Tropical horse tick on horses. Kerosene against the Spinose ear tick on live stock(p.69) and crude petroleum(p.61) against fowl ticks(Argas miniatas) infesting poultry.

846 1891, Hopkins, A. D.

Farm and garden insects with notes of the season.

W. Va. Agr. Exp. Sta. Bul.14,pp 63-79

Saw dust impregnated with natural heavy W. Va., oil was used as a repellent for the striped flea beetle.

847 1897, Hopkins, A.D.

Some observations on the plum tree gall mite

W. Va. 9th Ann. Rept. Agr. Exp. Sta. for 1896 P 140-2

Kerosene emulsion had no effect on the gall mites when diluted 1-15,1-9,& 1-4

848 1898. Hopkins, A.D.

Some notes on observations in W. Virginia.

U.S.D.A.Div.Ent.Bull.17,n.s.,pp.44-49.

Pure kerosene was sprayed on an apple orchard with more or less injury to the trees. Only a few living scale were found.

849 1903 - Hopkins, A. D.
Powder post injury to seasoned wood products.

U.S.D.A. Div. Ent. Circ. 5?; 5 pp.

A liberal application of pure kerosene, benzine or gasoline to the infested wood will destroy the insects.

850 1907 - Hopkins, A.D.
The locust borer and methods for its control

U.S.D.A. Bur. Ent. Circ. 83; 8 pp.

The R & H formula for making kerosene emulsion is given. For use on locust trees dilute 1 gal stock with 2 gals. water. Pure kerosene and pure petroleum will kill the insects but does seem damage to the trees.

851 Hopkins, A.D.
1910.
U.S. Dept. Agr. Bur. Ent. Bul. 54, p.84

Kerosene against White Ants and Powder-post beetles in seasoned wood products.

852 Hopkins, A. D.
1910?.
U.S. Dept. Agr. Bur. Ent. Bul. 58, pp37-38.

Kerosene, kerosene emulsion, and petroleum against the Locust Borer infesting trees.

853 1917. Hopkins, A.D. & Snyder, T.E.

Powder post damage by Lyctus beetles to seasoned hardwood.

U.S.Dept.Agric.Farmers'Bul.778, 20 pp.

Applications of pure kerosene oil with a brush to infested material will destroy the powder post beetle. Some materials may be dipped in kerosene.

854 1921 Horne, W.T., and Essig,E.O.

Plant diseases and pest control. Univ. Calif. Agric. Expt. Sta. Circ. 227, 69 p.

See Supplementary abstract

855 1915. Hornig, H.

Mosquito extermination work in Philadelphia.

Pa.Entom.News, Vol.XXVI, No. 3, pp.123-125.

The most efficient work in controlling of mosquitoes was the oiling of sewer inlets.

856 1904-Houghton, C.O.

Report of the entomologist, Dela. Coll. Agr. Expt. Sta. Rpt. 1903, pp. 141-159.

For San Jose scale, pure kerosene was applied to plum, pear, apple and cherry trees. Plum was not injured, but apple was seriously injured; pear slightly injured; cherry apparently not injured. No living scale were found during remainder of season. Crude petroleum undiluted, injured young apple trees, and pear trees only slightly and did not injure cherry trees. All scales were killed.

Kerosene emulsion made according to formula: Hard soap 1 lb., water 2 gals., kerosene 4 gals., used at 16 to 20% very satisfactorily and kept trees comparatively free of scale all season. 10 to 15% kerosene emulsion was used on a walnut tree infested with the oyster shell.scale. No injury resulted and all scales were apparently killed.

857 1904 - Houghton, C.O.

Two common scale insects.

Delaware Coll. Agr. Expt. Sta. Bul. 64, part 2, pp. 44-48.

A cheap and satisfactory remedy for the oyster-shell scale is kerosene emulsion, applied shortly after the emergence of the young. The same remedy is equally applicable to the scurfy scale. Formula for the emulsion is hard soap ½ lb., water ½ gal. and kerosene 1 gal. An emulsion thus made contains about 66% kerosene and may be readily diluted with water to give any percent of oil desired. When so diluted it should be applied in the form of a fine spray.

858 1904-Houghton, C. O.

Two common scale insects, Delaware Coll. Agr. Expt. Sta. Cir. 3, p. 6.

859 1906 - Houghton, C. O.

Some Experiences with insecticides for the San Jose scale. Delaware, Coll. Agr. Expt.Sta. Bul. 74, 16 pp.

The so-called "soluble oils" "Kil-o-scale", "Scalecide" and "Emulsified Con-Sol" gave satisfactory results when applied in the spring. Fall applications of "Kil-O-scale" were satisfactory in one case but not entirely so in another. "Scalecide" applied once as a fall spray was quite unsatisfactory. Applied to apple trees as a summer spray, 1-28, Scalecide gave valuable results. Kerosene emulsion, with soap as an emulsifying agent, gave satisfactory results. "Emulsified Con-Sol", a combination of heavy mineral oil with napthol, applied in the spring, 1-20, gave quite satisfactory results.

19[illegible] - Houghton, C.O.

Report of the Entomologist, Delaware Coll.Agr. Expt. Sta. Rpts. 1904-1906. pp. 77-107.

Experiments were conducted with Scalecide, Kil-O-scale, Target Brand Scale Destroyer, Con-Sol in spring, summer and fall applications, and with various forms of kerosene emulsions, ~~have been tried for~~ San Jose scale. Work upon the kerosene emulsions has not been completed. The most important results with the miscible oils will be found in Bul.74 of this station. For the leaf miner spray the trees in June with 10 to 12% kerosene emulsion just as the moths are emerging. Just before the leaves fall ~~and~~, if the trees are infested with San Jose, scale, spray them with 20% kerosene emulsion or with with one of the miscible oils. Scalecide, Kil-O-scale, and Target Brand Scale Destroyer should be used at the rate of 1 to 15 or 20 parts water. These oils were quite effective in killing the leaf miner larvae in the mines. Crude oil, kerosene and Phenotas oil were used on mosquitoes. Crude petroleum was better than kerosene, and Phinotas oil was better than crude petroleum.

861
1907 - Houghton, C.O.

Orchard tests of miscible oils.
Delaware Coll. Agr.Expt. Sta. Bul. 79, Part II, pp. 35-40.

See Supplementary abstract

1906 - Houser, J. S.

862 Spraying for the San Jose Scale

Ohio Agri. Exp. Sta. Bul. 169, pp. 139-155

Kerosene limoid was prepared by stirring 1 gal. of kerosene and 3 lb. of limoid together, after which 5 gals. of water was added and the whole churned violently for 2 minutes with a perforated dasher. Then 7-1/2 gals. of water was added and the entire mixture was placed in a spray barrel and agitated for 3 minutes more. The spray was then applied without delay. The nozzles clogged very badly, and the wash did not settle and spread evenly, but collected in globules. The results were not satisfactory, as a considerable quantity of new scale set during the season.

Scalecide was tested using 1 gal. to 20 gals. of water. The results from this material were more satisfactory than with any of the patent mixtures. It was only slightly inferior to XXXXXXXXX normal sulfur washes.

863
1907 - Houser, J. S.

The More Important Insects Affecting Ohio Shade Trees

Ohio Agr. Expt. Sta. Bul. 194, pp. 16[illegible]

Kerosene emulsion formula: Kerosene 2 gals; soap 3/4 lb water 1 gal. The water is heated and the soap dissolved in it. The kerosene is then added and agitated until a thick creamy mass is formed. Kerosene limoid is made as follows: Kerosene 17-1/2 gals, lime 50 lbs, water 34-1/2 gals. Scalecide and other so-called soluble soluble oils require dilution with water only. A 5% mixture is recommended for scale.

1916 - Houser, J. S.

864 Recent tests of materials for controlling San Jose scale.

Monthly Bull. Ohio Agric.Exp. Sta..Vol.I,No.1, pp 21-27.

Two brands of soluble oils were used in tests. Scalecide and Frost's insecticide applied at 1-15 dilution gave excellent results against scale. These oils are easy and pleasant to apply and cover the tree well. They have no fungicidal value.

865
1920. Houser, J. S.

Recent tests of materials to control San Jose scale.

Ohio Agr.Expt.Sta.Monthly Bull., Vol.5,No.2, pp.46-51.

Scalecide 1-15 and Key brand miscible oil 1-15 gave perfect results on plots in a mixed orchard of apple and peaches. The application was made on April 3 and 5,1919, and examined on Sept. 2 and Oct.9,1919.

1923 - Houser, J. S.

The Apple Flea-weevil, Orchestes pallicornis Say; Ohio Agric, Expt. Sta. Bull. 372, pp. 395-434.

Branches infested with the weevil were sprayed with kerosene emulsion at strengths of 5, 7½, 10 and 15%. A canvas was spread under the tree to catch the weevils as they dropped. The 5% emulsion did not kill the beetles outright, and it was necessary to spray them as they lay on the canvas to insure their death; but the stronger emulsions apparently killed all the adults hit by them. Fuel oil was used with some success, but gross effect on the beetle population was not noticeable.

867
1908. Howard, C. W.

The scale insects of citrus trees.

Transvaal Agr.Jour.Vol.6, no.22,pp.265-277.

The R & H formula is given.

1892
868 Howard, L.O.

Insect Life, Vol.5, No.1, p.12

Kerosene against mosquitoes

869
1893. Howard, L. O.

Another mosquito experiment.

Insect Life,Vol.VI,No.2,p.90-1.

Kerosene was used on pools.

870
1893. Howard, L. O.

The San Jose scale. An important enemy to the fruit trees.

U.S.D.A. Div.Ent.Circ.3,10 pp.

The R & H formula is given.

871
1893 - Howard, L.O.
An important enemy to fruit trees; the San Jose scale.

USDA Bur. Ent. Circ. 3 (2nd ser) 10 pp.

For the young lice, kerosene emulsion made by the R & H formula diluted 1-9 is recommended.

872
1894 - Howard, L. O.
The carpet beetle or buffalo moth.

USDA. Div. Ent. Circ. 5; 2nd ser. 4 pp.

The carpets should be sprayed with benzine. Kerosene or benzine should be sprayed in the cracks of the floor and under the baseboards.

873
1894. Howard, L. O.

Another mosquito experiment.

24 Ann.Rept.of Ent.Soc.Ontario for 1893.pp.66-67.

Kerosene was used on pools for the mosquito larvae.

874
1894? Howard, L.O.

U.S.Dept.Agr. Div.Ent. Bul.2, n.s., p.42

Kerosene emulsion against Elm Leaf Beetle infesting elms.

875
1895. Howard, L. O.

Some scale insects of the orchard.
U.S.D.A.Yearbook 1894, pp.249-276.

Kerosene emulsion was recommended for the scurfy scale, the oyster shell scale and the peach lecanium. One or two applications of the emulsion, diluted 1-10, from the first to the last of June, will kill the young scales and prevent undue increase of the species.

876
1895. Howard, L. O.

Further notes on the San Jose scale.

Insect Life, Vol. VII, No. 4, p. 283-295.

Three applications of a diluted kerosene emulsion as a summer spray will keep the insects from increasing to any serious extent.

1895 - Howard, L. O.
877 The Harlequin cabbage bug or calico back.

USDA Div. Ent. Circ. 10, 2 pp.

When this insect collects on mustard plants in the spring, they should be sprayed with pure kerosene or kerosene emulsion diluted 1-1.

1896 Howard, L.O.
878

U.S.Dept.Agr. Bur.Ent. Bul. 5, n.s., p.29

Kerosene against mosquitoes in houses on the ceilings.

879
1896? Howard, L.O.

U.S.Dept.Agr. Bur.Ent. Bul.5, n.s., p.29

Kerosene agains mosquito larvae in pools.

880
1896 - Howard, L. O.
Mosquitoes & Fleas.

U.S.D.A. Div. of Ent. Circ. 13, (2nd Ser) 4 pp.

Kerosene sprayed on ponds of water will help to destroy mosquitoes. Benzine sprayed on carpets and floors is effective for fleas.

881
1898 - Howard, L.O.
Further notes on the house fly
USDA Div. Ent. Bul. 10, n. ser. pp. 63-65.

Kerosene poured on manure piles is effective in destroying the house fly larvae.

882
1898 - Howard, L.O.
The San Jose scale in 1896-97.

USDA Div. Ent. Bul. 12, n.s. 31.pp.

Results of the other workers who have used pure kerosene are given. Kerosene mixed with water is recommended9

883
1898. Howard, L. O.

The box-elder plant-bug.

U.S.D.A.Div.Ent.Circ.28, 3 pp.

Spraying the plants early in the season with kerosene emulsion will result in the death of most of the immature forms.

884
1898 - Howard, L.O.
House Flies.

U.S.D.A. Div.Ent.Circ. 35, (2 ser.) 8 pp.

Living maggots may be killed by spraying with kerosene and washing down with water.

885
1899. Howard, L. O.

A remedy for gad flies; Porchinski's recent discovery in Russia, with some American observations.

U.S.D.A.Div.Ent.Bul.20,n.s.,pp.24-28.

Kerosene as a film on pools was used for destroying the gadflies.

885
1899. Howard, L. O.

Three insect enemies of shade trees.

U.S.D.A.Farmers' Bul.99, 29 pp.

Kerosene emulsion will destroy the larvae and the quiescent pupae when diluted 1-5.

887
1900 - Howard, L.O.
The two most abundant pulvinarias on maple

USDA Div. Ent. Bul. 22, n.s. pp. 7-23.

Spraying in the fall just before the leaves ~~are~~ drop with kerosene emulsion will kill the insects.

888
1900. Howard, L. O.

Notes on mosquitoes of the United States.

U.S.D.A.Div.Ent.Bul.25, n.s., 70 pp.

Kerosene is used on pools for the destruction of mosquito larvae. The quickest and most perfect method of forming a film of kerosene is to spray the oil over the surface of the water.

889
1900 Howard, L.O.

Progress in economic entomology in the U.S.

U.S.D.A. Yearbook 1899, pp. 135-156.

See Supplementary abstract

890
1901 - Howard, L.O.
On the habits of Entilia sinuata. (Sub-title)
USDA Div. Ent. Bul. 30, n.s., pp. 75-78.

Kerosene emulsion spray is an efficient remedy.

891
1901 - Howard, L.O
Ineffectiveness of kerosene emulsion against white grubs. (Sub-title)

USDA Div. Ent. Bul. 30, n.s., p. 94.

Kerosene emulsion was used against Lachnosterna fusca. It was not effective.

1904? Howard, L.O.
892

U.S.Dept.Agr. Div.Ent. Bul.44, p.97

Crude petroleum against Cut Worms infesting Walnut trees. (California)

893
1906. Howard, L. O.

House flies.

U.S.D.A.Bur.Ent.Circ.71, 9 pp.

It was found that 8 qts.of fresh horse manure sprayed with 1 pt. of kerosene, which was afterwards washed down with 1 qt. of water, was thoroly rid of living maggots.

894
1908. Howard, L. O.

How insects affect health in rural districts.

U.S.D.A.Farmers' Bul.155, 19 pp.

Kerosene is recommended for use on mosquito larvae ponds that can not be drained.

895
1910 - Howard, L. O.
Preventive and Remedial work against Mosquitoes.

USDA Bur. Ent. Bul. 88. 126 pp.

A light fuel oil is recommended for use on ponds for mosquito larvae.

896
1915. Howard, L.O.

Remedies and preventives against mosquitoes.

U.S.D.A.Farmers' Bull.No.444, 15 pp.

Kerosene of a low grade or of a grade known as fuel oil, is the most satisfactory as regards efficiency and price for destruction of larvae by treatment of breeding places.

897
191[illegible]. Howard, L. O.

Report of the Entomologist for the year ending June 30, 1916.
Ann. Rpt. U.S.D.A., Bureau of Entom, 1915-16, 24 pp.

Sodium arsenate used at the rate of 1 lb. to 2 gals. of water to dilute 1 gal. of stock kerosene emulsion was found effective for killing certain bark and wood boring insects.

898
[illegible]. Howard, L.O., Dyar, H.G. & Knab, F.

The mosquitoes of North and Central America and the West Indies.
Carnegie Institution of Washington, Vol.I, pp. [illegible].

A grade of oil known as fuel oil was found to be best suited for oiling. [illegible] It [illegible] in some places 1 oz. of kerosene to [illegible] surface [illegible] the correct proportion, [illegible] The oil may be [illegible] surface of [illegible]

899
1896 - Howard, L. O & Marlatt, C.L.
The San Jose scale.
USDA Div. Ent. Bul. 3 (n.s.) 80 pp.

The R & H formula and kerosene & milk formula are given for kerosene emulsion.

900 Howard, L. O & Marlatt, C. L
1896. The principal household insects of the United States.
U.S.D.A. Bur. Ent. Bul. 4, n.s. 131 p.

~~XXXX~~ If a room is infested with cheese, ham or folour, mites it should be cleaned out, fumigated with sulfur and washed out with kerosene emulsion.

901
[illegible]. Hubbard, H.G.

Scale-insects of the orange. Remedies and their application.

Rept. of the Entomologist. Ann. Rept. of U.S. Dept. of Agr. for the year 1881 pp. 106-127.

Kerosene emulsified by means of sour milk and churning for a time gave very good results against the scale insects in Florida.

902
1883. Hubbard, H.G.

Report of progress in experiments on scale insects, with other practical suggestions.
Report of the Entomologist. Rept. of the U.S. Commissioner of Agr. for 1883. pp. 152-159.
Further experiments with kerosene emulsion proved that various soaps could be readily made to combine with the oil, and that the soap-kerosene emulsions were as effective as those formed with [illegible]. Common bar soap, soft soap and whale oil soap were tried and found to be equally good. The following formula is given: Kerosene 2 gals, soap 1/2 lb, water 1 gal. This should be diluted 1-9 before using.

903
1885. Hubbard, H. G.

Insects affecting the orange.

U.S.D.A. Div. Ent. 227 pp.

The R & H formula for kerosene emulsion is given, also the kerosene milk formula.

904
1925. Huber, L.L.

Some Spray tests with oil emulsions.

Jour. Econ. Ent. vol. 18, no. 3, pp. 5[illegible]7-[illegible].

See Supplementary abstract

905
1888 - Hulst, George D.

Insect pests and the means for destroying them.

New Jersey Agr. Coll. Expt. Sta. Bul. 46, 31 pp.

Riley's formula for kerosene emulsion is given.

906
1888. Hulst, G. D.

Insects injurious to the cabbage and the best means of preventing their ravages.

N. J. Agr. Expt. Sta Bul. 50, 21 pp.

The R & H formula is given.

907
1919. Hutchings, C. B.

The imported leaf miner.

11th Ann. Rept. Quebec Soc. Prot. Plants from Insects & Diseases, 1918-1919; pp. 35-37.

Kerosene emulsion 1-5 was found the best spray if applied when the larvae were young and when their work began to be noticed on the leaf surface.

908
1924. Hutchings, C. B.

The lesser oak carpenter worm and its control.

Canada Dept. Agric., Circ. 23, 4 pp.

Lead arsenate in an oil carrier such as kerosene emulsion or miscible oil was used with fair success on the oak carpenter worm.

909
1919. Hutchison, R. H. & Pierce, W. D.

Studies on the dry cleaning process as a means of destroying body lice.
Proc. Entom. Soc., Wash. Vol. XXI, No. 1, pp. 8-20.
Gasoline is of no value as an ovicide, 18.7% of the eggs hatched in one test after 54 hrs. immersion. Laboratory tests with a series of oils showed that benzol killed after 2-4 hrs. immersion. Kerosene killed within 10 minutes; gasoline-kerosene mixtures killed after 15 minutes; gasoline-soap emulsion had little killing effect on eggs after 30 minutes emmersion.

910
1919. Hutson, J. C.

Some minor insect pests in Ceylon in 1919.

Trop. Agriculturist, Peradeniya, Vol. LIII, No. 2, pp. 139-141.

Plant bugs on tea can be collected in a tin of kerosene and water.

911
1921. Hutson, J. C.

Scale insects and mites upon tea.

Trop. Agric., Peradeniya, Vol. LVI, No. 6, pp. 378-380.

In severe scale infestion on the tea, spraying with kerosene emulsion is effective.

912
1923. Hutson, J. C.

The cotton leaf caterpillar, <u>Cosmophila erosa</u>.

Trop. Agric. Vol. LX, No. 3, pp. 159-161, Peradeniya,

Hand picking the caterpillars and cocoons and placing in kerosene and water is recommended as a control measure.

913
1912. Illingworth, J. F.

A study of the biology of the apple maggot, together with an investigation of methods of control.

N.Y. (Cornell) Agr. Expt. Sta. Bull. 324, pp. 125-187.

The adults were not attracted to kerosene traps.

1918 - Illingworth, J.F.
914 Work of the division of entomology, 18th Ann. Rept., Queensland Bur. Sugar Expt. Stations, 22nd Oct, 1918, pp 24-29

Cane beetles are caught in kerosene and water traps.

915
1918, Illingworth, J. F. & Jarvis, E.

Cane grub investigation

Queensland Agri. Jl. Vol. IX, Pt. 2, pp. 72-73

The beetles are caught in trays of kerosene coated water, around lights.

916
1920. Imms, A. D. & Husain, M. A.

Chemotropic responses of insects.

Ann.App.Biol.Vol.VI,No.4,pp.269-292.

Kerosene was negative in its chemotropic influences. The kerosene used in the trials probably differed in composition from that employed in America.

917
1918. Imes, M.

Cattle lice and how to eradicate them.

U.S.D.A.Farmers' Bul.909,26 pp.

Where only a few animals are to be treated spraying can be done. The following remedies have proved effective: Cotton seed oil and kerosene, equal parts; kerosene and lard mixed in proportions of 1/2 pt. of kerosene to 1 lb. lard; crude petroleum.

918
1918. Imes, M.

Cattle scab and methods of control and eradication.

U.S.D.A.Farmers' Bul. No. 1017, 29 pp.

Crude oil dip is very useful in treating cattle for sarcoptic scab and has proved to be an effective remedy for that disease. The oil is liable to injure the animals.

919
1920. Imes, M.

Hog lice and hog mange. Methods of control and eradication,

U.S.D.A. Farmers' Bul. 1085, 28 pp.

Crude petroleum dips are effective in eradicating lice and mange from hogs. For a few hogs kerosene sprinkled over their backs is also effective.

920
1901. Innis, A. C.

Kerosene and San Jose scale.
Rural New Yorker,Vol.LX,No.2693,Sept.1901, p.610.

Trees sprayed in full leaf with 15% kerosene showed no injury to leaf or fruit and 90% of the scale was killed. 15% crude oil stripped off all the foliage and fruit, and killed 95% of the scale. 20 and 30 % crude oil killed everything it touched.

921
1921. Ironside, F.

Paraffin and the carrot fly.

Gardeners' Chronicle,London,Vol.LXX,No. 1819, 5th Nov.1921, p.237.

Wood ash with which paraffin had been mixed at the rate of 1 qt. to the bushel, was spread thinly over the carrot bed. The hose was used to wash the paraffin down to roots of the carrots. The grubs were found dead, upon examining the bed a few days later.

922
1917. J. C. H.

The spiny citrus white fly, a potential pest of citrus trees.
Agric.News. Barbados, Vol. XVI, No. 384, pp. 10-11.

The following formula for oil emulsion was used on the white fly: Whale oil soap, 2 lbs.; heavy paraffin oil, 2 gals.; water, 1 gal. These materials were mixed in the usual way to form an emulsion.

923
1915 J. F.

Manzanos enfermos del Schizoneura lanigera.

Graceta Rural, Vol. 8, No. 95, p. 703.

Apple trees should be washed in winter with kerosene emulsion (Black soap 1 kg.; kerosene 1 liter, water, 10 liters.

924
1875. J. M. W.

Kerosene oil for insects.

Gardner s Chronicle, Vol.VIII,N.S.,No.4,p.106.

Some moderately strong soap suds are made and a little oil is mixed with it. It must be used at a dilution suitable to the nature of the plant requiring treatment.

925
1923. Jack, H. W.

Rice in Malaya.

Malayan Agric.Jl.Vol.XI, Nos.5 & 6, pp. 103-119 & 139-161.

A 2% kerosene emulsion sprayed on the plants is an effective remedy against the samll green Jassid bug (Nephotettix bipunctatus).

926
1916. Jack, R. W.

Rhodesian Citrus Pests.

Rhodesia Agric.Jl., Vol. XIII, No. 2, pp. 215-233.

Kerosene emulsion 1-12 may be used for aphid destruction.

927
1917. Jack, R. W.

The turnip Sawfly.

Rhodesia Agric. Jl., Vol. XIV, No. 2, pp. 206-212.

The R & H kerosene emulsion was used to control the sawfly.

928
1893? Jackson, W.P.

Insect Life. Vol. 6, No.1, p.36

Kerosene and water against Locusts

929
1914. Jackson, H.S. & Wilson, H.F.

How and When to spray the orchard.

Oregon Agric.Coll.Bull.,123, Extension Series 11, No. 177, 23 pp.

The R & H formula for making kerosene emulsion is given. Crude oil emulsion may be made by the same formula.

930
1916. Jackson, R. W. H.

Administrative control of plague.

Jl.State Med.,London,Vol.XXIV,No.9, pp.277-284.

Rooms or houses infested with fleas should be thoroly washed with crude oil emulsion. The emulsion consists of 80% crude oil and 20% whale oil soap. A 10% solution will kill the fleas.

931
1914. James, S. P.

Summary of a year's mosquito work in Colombo.
Indian Jl. Med. Research, Vol.II,No.1,pp. 227-267.

A mixture of crude oil and kerosene was used as the larvicidal agent.

932
1922 - Jardine, J.T.

Department of Entomology, Oregon Agr. Coll. Expt. Sta. Bien. Rept. 1920-22, pp. 75-79.

For leaf-rollers and fruit worms combinations of oil emulsions, 5% oil, with lime and glue gave best results. 8 different oils were tested and 28 different combinations of organic materials with laboratory-prepared emulsions of cylinder oil were used in a series of tests. The most promising was picric acid in a cylinder oil emulsion.

933
~~Jarvis, C. D.~~
1907.

Petroleum emulsion for the San Jose scale.

Conn. (Storrs) Agr. Expt. Sta. Bul. 49, p. 5. Superseded by Bul. 54.

A simple method of making a petroleum emulsion or "soluble oil" is given. The formulae is considered under two heads. First the emulsifier: Carbolic acid (Crude liquid 100%) 2 quarts, fish oil 2¼ qts., caustic soda (granulated) 1 lb.; Heat to 300°F, Remove from fire and immediately add kerosene 3½ qts. water 5½ qts. This formula is sufficient to make 13 gals. of the complete "Soluble oil", or 208 gals. of the spray mixture. The complete soluble oil formula is: Emulsifier 8 parts, crude petroleum 18 parts rosin oil 4 parts, water 1 part. They should be brought together in the order named. This is then used 1 part to 15 parts water.

934
Jarvis, C.D.
1908.

Proprietary and homemade miscible oils for the control of the San Jose scale.

Connecticut (Storrs) Agr. Expt. Sta. Bul. 54, pp. 169-197.

See Supplementary abstract

935
Jarvis, C. D.
1909.

Control of insects and of plant diseases.

Conn. Agr. Expt. Sta. (Storrs) Bul. 56, pp. 219-282.

Formulae for making kerosene emulsion: Hard soap 1/2 lb., hot water 1 gal., kerosene 2 gals. For killing plant lice, or other soft-bodied sucking insects on foliage, dilute 8-15 times. For use on dormant trees dilute 3-5 times. Miscible or "Soluble" oils are mostly petroleum products so treated that they may be mixed with water. They should not be used at a strength less than 1-15.

936
1911. Jarvis, C. D.

A home made soluble oil for the San Jose scale.

Can. Hort. Vol. 34, No.2, p.28-30.

See Connecticut Agr.Expt.Sta.Bul. 54 for abstract.

937
1922, Jarvis H

Fruit fly investigations, Third Progress Rept.
Queensland Agric, Jl. Vol. XVIII, Pt. 1, pp 15-17

Thrips attacking garden shrubs may be dealt with by spraying with kerosene emulsion or miscible oil.

938
1912. Jennings, A. H.

Some problems of mosquito control in the tropics.

Jour.Econ.Ent.Vol.V,No.2,pp.131-141.

As a supplement to permanent or temporary drainage, crude oil or other larvicides are used.

939

Johansen, E.M. Iodine and bromine values of petroleum products. Jour. Ind. and Eng. Chem., vol. 14, Apr. 1922, pp. 288-292. Results of experiments.

940
1910. Johnson, F. & Hammer, A. G.

The grape root-worm.

U.S.D.A.Bur.Ent.Bul.89,100 pp.

Experiments conducted against the larvae in the soil with oils have proved ineffective.

941
1905 - Johnson, S..Arthur.

The cottony maple scale; an unusual outbreak;and experiments with insecticides.

USDA Bur. Ent. Bul. 52; pp. 85-88.

Kerosene emulsion 1-6 or 8 is effective against the cottony maple scale. The kerosene was emulsified with whale oil soap.

942
Johnson, S.A.
1906.

The Cottony Maple Scale.

Colorado Agric. Expt. Sta. Bul. 116, 16 p.

Kerosene emulsion is not entirely effective against the cottony maple scale in summer even with a very high % emulsion. The scale may be controlled by a winter treatment of kerosene emulsion 15% or greater in strength. It may be necessary to use a higher percentage where climatic conditions are unfavorable. A greater concentration of soap than is contained in the formula is recommended.

943
1911. Johnson, S. A.

Kerosene emulsion.

Green's Fr.Grow.Vol.31,No.12,p.18.

The following formula is given: Kerosene 2 gals; soap 3/4 lb., water 2 gals. This is emulsified in the usual way.

944
1911. Johnson, S. A.

Kerosene emulsion.

S.W. Stockm. July 21,1911,p.9.

The formula for the stock emulsion is as follows: Kerosene 2 gals, soap 3/4 lb., water 2 gals. The stock is emulsified in the usual way.

945
1911. Johnson, S. A.

Farmers' Guide,Vol.XXIII,No.33,Aug.19, 1911,p.5.

The formula for the stock emulsion is as follows: Kerosene, 2 gals; soap, 3/4 lb; water, 2 gals. This was emulsified in the usual way.

946
1904 - Johnson, T.C.
Mixtures and applicances for spraying
W. Va. Agr.Expt Sta.Bul. 93; pp. 65-118.

The B & H formula for kerosene emulsion is given. A 25 to 40% kerosene and water mixture may be used on apple and pear trees when dormant. Pure kerosene and crude petroleum may be used for soft scale if applied with care.

947
1898 - Johnson, W. G.
Report on the San Jose Scale in Maryland and Remedies for its Suppression and Control.

Md. Agric. Expt. Sta. Bull. 57. 116 p.

See Supplementary abstract

948
1898? Johnson, W.G.

U.S.Dept.Agr. Div.Ent. Bul. 17, n.s. p.52

Kerosene against San Jose Scale on fruit trees.

949
1899. Johnson, W. G.

Miscellaneous entomolo. ical notes.

U.S.D.A.Div.Ent.Bul.20,n.s., pp.62- .

Lygus pratensis was sprayed/with successfully 15% mixture of kerosene and water. A 12% mixture of kerosene and water was used on the currant worm and melon louse.

950
1897 - Johnson, Willis G.

Some Common Injurious Plant Lice with Suggestions for their Destruction.
Md. Agric.Expt. Sta. Bul. 48, pp. 89- 101.

Kerosene emulsion is very effective for the melon aphis. It is made by using ½ lb. hard soap (or soft) (ivory preferable) water 1 gal., kerosene 2 gals.,The soap is dissolved in boiling water, and the kerosene poured in to this mixture, ~~and this~~ should be pumped in and out at least 12 to 15 times.

951
1898 - Johnson, W. G.

The Black Peach Aphis,
Md. Agric.Expt.Sta. Bul. 55, pp. 137-140

Kerosene emulsion is most effective for the black peach aphis. It is made by dissolving ½ lb. hard soap in 1 gal. boiling water and to this add 2 gals. kerosene. This should be pumped in and out of the vessl for 5 to 10 minutes. Every gal. of this emulsion used ~~shoul~~ be diluted with from 10 to 12 gals. of water and applied with a good spray pump.

952
1900 - Johnson, Willis G.
Some Important Insects and Insecticides.
Maryland Agr. Expt. Sta.Bul. 65; pp. 56-63.
Kerosene emulsion has long been an effective remedy for certain insects. The kerosene and water mixture is mechanically mixed by means of a specially designed apparatus. This has been found satisfactory. The emulsion may be made by dissolving ½ lb. soap (ivory soap preferable) in 1 gal. boiling water, pouring 2 gals. of kerosene into this and pumping in and out of the vessel with a good force pump for 5 to 10 minutes. For plant lice dilute 1-10 or 12. Under no circumstances use pure kerosene upon plant life of any kind.

953
1902. Johnson, W. G.

San Jose scale and latest methods of treatment.

Rept.N.Y.State Fruit Growers' Assn. for 1902, p.76-94.
Refined kerosene diluted with water gives very good results on the scale. A 20 to 25% solution is very effective when applied early. A 20- 25% crude petroleum spray is also very effective if sprayed before the buds begin to open.

954
1910 - Jones, P.R.
Papers on deciduous fruit Insects and Insecticides; Tests of sprays against the Eruopean fruit Lecaniu and the European pear scale.

USDA Bur. Ent. Bul. 80; pt. 8, pp. 147-160.

See Supplementary abstract

955

Jones,P. R.
1914. Oil sprays. Five years successful use.

Better Fruit. Vol. 8, No. 7, pp.33-38.

See Supplementary abstract

956
1915. Jones, Paul.R.

Preliminary report on spraying of eggs for the control of the purple scale and green aphids of California.
Mthly.Bul.Calif.Comm.Hort., Vol.4,No.1,p.20-30.
Of the oils and oil emulsions used (Yel Ros and miscible oil No.2) were made from high gravity oils running from 38° to 41° Be. Miscible oil No. 1, Distillate oil emulsion, asphalt emulsion and crude oil emulsion were all from heavy oils running from 29° Be down to 14° Be.
Formulas for the home made emulsions are as follows; (over)

Asphalt emulsions:

Water	2 parts	Diluted 1 - 7 for use.
Cresol soap	5 "	
Oil, 14°Be	25 parts	

Home made distillate oil emulsion:

Water	2 parts	Stock diluted 1 - 6 for use.
Cresol soap	5 parts	
Distillate oil 26°-29°Be.	25 parts	

Distillate gasoline emulsion:

Water	1 part	Stock diluted 1 - 12 for use.
Cresol soap	6 parts	
gasoline	8 parts	
Distillate oil 26°-29° Be	17 parts	

(contd)

-2-

Jones, Mthly.Bul.Calif.Comm.Hort.No.1.

The distillate-gasoline emulsion was a combination of high gravity and low gravity oils, the theory being to have the high gravity for penetration and the low gravity for lasting effects. In all of the oils it might be said these were emulsified by cresolating the oils and all the oils used were made from an asphalt base. All of the oils gave good commercial control except Yel Ros and the miscible Oil No.2, when used by themselves.
As regards comparison of Western Miscible oils and Eastern miscible or soluble oils, it might be stated that most of the miscible and soluble oils made in the East are a combination of light lubricating oil combined with a vegetable oil and usually run about 70% of the mineral oil and 20% of the vegetable oil (the latter usually sulphonated), whereas the Western miscible oils are usually cresolated oils and run about 85% mineral oils from an asphalt base type.

957
1918. Jones, P. R.

The selection of petroleum insecticides from the commercial point of view.
Mthly.Bull.Cal.State Commiss.Hortic.,Vol.VII, No.4, pp.189-191.
The orchardist looks at any insecticide from three standpoints: (1) Safety (to fruit and foliage); (2) Efficiency; (3). Cost. A discussion of these points follows:
The types of petroleum insecticides may be classed in three main divisions:
(1) Mechanical mixtures,of oil and water, which depend upon great agitation during the time of application.
(2) Mechanical emulsions are usually made by mixing oil, soap solutions and water at high pressure thru pumps, and after the oil has been thoroly worked up into the soap and water, drawing the mixture off in the form of a thick emulsion. This type breaks down very readily.
(3) The miscible or soluble oils. These products are characterized by a low water content, high oil content and high emulsifier content in proportion to the oil.
The oils of the miscible type have less tendency to break down on the tree than those of the mechanical type. This causes them to be more perfect as regards insect kill, and to cause less injury to the trees if the right oil is used in the manufacture and if the correct dosage is used in the application.

958
1918. Jones, P. R.

Machine gun work with a new formula on red spiders in Tulare County.
Mthly.Bull.Cal.State Commiss.Hortic.,Vol.VII,No. 7, pp.455-457.
The following formula was used to completely rid an orchard of red spiders when applied with spray guns; 6 gals.orchard brand lime sulphur solution.
2 gals.Triumph oil, 1 lb. ground glue per 200 gallon spray tank. Ten minutes after applying no living red spiders could be found ~~(alive)~~

959
1911 - Jones, P. R. & Horton , J.R.
The Orange thrips.

USDA Bur. Ent. Bul. 99; Pt. I; pp. 1-16.

Homemade distillate oil emulsion in combination with black leaf-tobacco extract was not as effective on the thrips as lime sulphur. A 2% oil was used.

960
1918. Jones, T. H.

The southern green plant-bug.

U.S.D.A. Bul. 689, 27 pp.

Kerosene emulsion diluted 1 - 2 gave unsatisfactory results on the green plant-bug. Undiluted kerosene quickly killed individuals in both the nymphal and adult stages.

961
[illegible] Joshi, S.S.

Viscosity of reversible emulsions. Trans. Faraday Soc. (advance copy) Cf. C.A. [illegible], [illegible]. C.A. 19, 761.

962
19[illegible] - Keffer, C.A.

The San Jose Scale.

Tenn. Agr. Expt. Sta.Bul. Vol. X[illegible]I. #2; pp.23-32.

Crude petroleum was used in experiments for two years. It was a reliable remedy in so far as it kills the scale when applied in strong solution (kerowater 20-25%) but there is danger to the trees in its application. The oils used were of a specific gravity of 32° Be and 40°Be. Because petroleum checked the growth of the trees in the spring and was dangerous to the trees, its use was not recommended.

963
1894. Kern, E. H.

Kerosene and animal parasites.

Insect Life, Vol.6, No.3, p.270.

Kerosene sprayed on the backs of hogs killed all the lice with no bad effects on the animals. The same was tried in hen houses to kill chicken mites, also lice on horses.

964
1913. Kershaw, J. C.

Froghoppers.

Dept. Agr. Trinidad, Spec.Circ.7, 4 pp.

Kerosene-lysol emulsion is [illegible] for the froghoppers on sugar cane. The following formula gives a 2% emulsion: 3 oz. lysol, [illegible] oz. [illegible] and 4 gals. of soft water.

965
1916. Kinclock, J. P.

An investigation of the best methods of destroying lice and other body vermin.

British Med.Jour.Vol.1, 1916, No.2892.pp.789-793.

In experiments with the volatile paraffin bodies, such as petrol and royal daylight oil, it was found that petrol ordinarily killed lice by immersion in 1 min. and invariably in two minutes, while the ordinary illuminant oils commonly killed in two minutes and invariably in 5 minutes.

966
1917 - King, J. L.

The lesser peach tree moth.

Ohio Agric. Expt. Sta. Bul. 307, pp. 395-448.

A spray of scalecide diluted 1-9 was tested during summer of 1914. Three sprayings were made only on the trunks and branches, after the removal of all larvae and cleaning of cankered areas. 30 trees were used in the exp. Final examination in the following spring showed seven trees infested. No injury was noted from the three applications.

967
1916 - King, W. V.

Report on the investigation and control of the Rocky Mountain spotted-fever tick in Montana during 1915-1916.

2nd Bienn. Rept. Mont.State Bd. Ent. 1915-16, pp. 13-23.

Sodium arsenite and a weak kerosene emulsion are now used in the dipping formula to replace the white arsenic-sodium-carbonite-pine tar formula in general use in the Texas fever tick work. The method of making the kerosene emulsion is to dissolve 12 lbs. of potassium soap (green soap) in 2 gals. of warm water. This is allowed to cool and the emulsion is made in a cold solution at the rate of 3 gals. of kerosene to 2 qts. of soap solution. The soap is placed in the tank and pumped back until it begins to foam. The kerosene is then added, slowly at first, with forceful spraying of the mixture back into itself. It is then diluted with water in a separate tank. Ten gals. of kerosene are emulsified in this way and added to the dipping vat in which the arsenic has been added.

1918 - Kirk, H.B.

968 On Mosquito larvicides

Trans. & Proc. New Zealand Inst., for 1917 Vol. [illegible] pp. 133-136

Light oil is better than crude petroleum The film is easy to see and spreads better. The following formulas for making emulsions of light oil are given (1) Soft soap 100 parts: light oil [illegible] parts; water 100 parts; caustic soda [illegible] [illegible] (2) Soft soap 20 parts; light oil 50 parts (3) Castor oil, 50 parts; caustic soda 15 parts, water 20 parts: light oil 170 parts. The light oil is the lowest fraction from the distillation product of coal tar. It is composed of constituents boiling from 200° to 210°C

1905 - Kirk, T.

969 Woolly aphis

New Zealand Dept. Agr. Ann. Rpt.Vol.13, pp 407-409

Kerosene was used as a spray for woolly aphis Complete destruction was obtained. No injury will result from its use, if applied when the trees are completely dormant. Kerosene emulsion may be used as a spring remedy

970
1899. Kirkland, A. H.

The San Jose scale in Massachusetts.

Mass. State Bd.Agr.Rpt.1898, pp.295-315.

Kerosene may be used for the control of the scale but some injury usually results from its use.

971
1900. Kirkland, A. H.

San Jose scale.

New England Farmer, Vol.78, No.40, p.2.

A uniform grade of oil should be used as a basis for experiment or wholesale treatment. The fruit growers should "go slow" in using petroleum on their trees.

972
1902. Kirkland, A. H.

Spraying for city and country.

Rhode Island State Bd.Agr.Rpt.1901, pp.202-217.

The R & H formula for making kerosene emulsion is given.

973
1907. Klein, Louis A.

Methods for eradicating cattle ticks.

S.Carolina Agr.Expt.Sta.Bul.130, 17 pp.

Crude petroleum was found very effective in ridding cattle of ticks. About four applications are necessary. The oil was applied by means of a piece of burlap dipped in the oil and rubbed over the cattle. An emulsion of oil may be sprayed on the cattle. The R & H formula was used for making the emulsion of crude oil, 20% oil was used.

974
1918. Knowles, C. H.

Division of Entomology.

Fiji Dept.Agric., Ann. Rept.for year 1917, Suva, Council Paper No. 60, pp.8-12.

Kerosene emulsion is used on scale insects.

975
1887. Koebele, Andrew.

Report upon supplementary experiments on the cottony cushion scale; followed by a report on experiments on the red scale.

Report of the Entomologist, Ann.Rept.of the U.S. Dept.Agr.for the year 1886, pp.558-572.

The cost of kerosene emulsion is too high for use as a remedy for the cotton cushion scale. No injury resulted from the use of the emulsion. Very good results were obtained with an emulsion of petroleum.

976
1893. Koebele, A.

Experiments with the hop louse in Oregon and Washington.
Insect Life, Vol. VI, No.1, pp.12-17.

Oil, 8 pts., water 4 pts., soap 1/2 lb. was used diluted 25 times on Phorodon, on plum and hop vines, but results were not satisfactory. An emulsion was prepared with 1 gallon kerosene, 2 gals. resin compound and diluted to 75 gals, did not work satisfactorily.

977
1921. Kotinsky, Jacob.

Insects injurious to deciduous shade trees and their control.

U.S.D.A. Farmers' Bul. 1169, 100 pp.

Kerosene emulsion is made by the R & H formula.

978
1924 Kraemer, E.O. and Stamm, A.S.

A new method for the determination of the distribution of size of particles in emulsions. J. Am. Chem. Soc. 46, 2709-18

979
1926 Krantz, J.C. and Gordon, N.E.

The effect of hydrogen-ion concentration upon ~~emulsio~~ emulsions.

J. Amer. Pharm. Assoc. 15, 93-94. (C.A. 20, 3256.)

980
1901. Kuwana, S. I.

The San Jose scale in Japan.

Contributions to Biology from the Hopkins Seaside Laboratory of the Leland Stanford Jr. Univ. No.25, pp.1-14.

The Japanese farmers apply kerosene and kerosene mixture with a paint brush. Often the small branches are killed without affecting the San Jose scale.

981
1904. Kuwana, S.I., and others.

The San José scale in Japan.

Imp. Agr. Expt. Sta., Japan, 33 pp.

Spraying with kerosene emulsion in winter, after the trees have been pruned, is the best method of destroying the scale. A 1-5 mixture kills more than 85% of the scale.

982
1925 Kyser, E.V. and Vilbrandt, F.C

Some critical points of emulsification in oil soap emulsions. J. Amer. Pharm. Assn. 14, 392-8. C.A. 20, 2391

Cf. also C A. 19, 379.

983
1917. Lall, Madan Mohan

Some important insect pests of cotton in the Punjab.
Dept. Agric. Punjab, Lahore, 1917. 7 pp.

The red cotton bug may be destroyed by collecting it in a pail of water which has a thin layer of kerosene on it.

984
1917. Lal, Madan Mohan

Report of the Asst. Professor of Entomology.

Rept. Dept. Agric. Punjab for 1916-17, appendix IV, pp.9-10.

Spraying with crude oil emulsion 1/2 pt. to 4 gals. of water was effective on Euphalerus citri.

985
1918. Lal, Madan Mohan.

Report of Asst. Prof. of Entomology.

Rept. Dept. Agric. Punjab, for 1917-18, appendix IV, p.8.

Spraying Euphalerus citri with crude oil emulsion was effective.

986
1920. Lal, M. M.

Experiments in entomology and sericulture.

Rept. Dept. Agric. Punjab, Part II, pp.153-157.

Crude oil emulsion was effective on Euphalerus citri.

987
1889.- Lake. E.R.

Practical work with insecticides.
Oregon Agr. Expt. Sta. Bul. no.3, pp. 1-6.
Apple trees infested with woolly aphis were treated with hot kerosene emulsion. The following strength was used: 12 qts water and ½ lb. whale oil soap were heated together and then 1 pt. kerosene was added. The mixture was churned with a force pump. When diluted with 5 gals. hot water the results were not satisfactory.

988
1926 Lánczos, Anna

Effect of paraffin oil on the intestine. Arch. exp exptl. Path. Pharm. 112, 365-78. C.A. 20, 2706.

Improtant.

989
1925 Lange, O.

Emulsions. Z. deut. Öl.- Fett-Ind. 45, 105-7, 121-2 151-3, 162-4, 190-2.

Technical emulsions.

990
1921 [illegible]

Grasshopper and Cricket repellents.

Jour. Econ. Ent., vol. 14, no. 3, [illegible] 263.

Kerosene next to CaS[illegible] was the most repellent substance tried. Gasolene was much less repellent

1912 - Laurie, D. F.

991 The poultry tick

Dept. of Agr. S. Australia, Bull. 74, 32 p

[illegible]

1913 - Laurie, D. F.

992 [illegible]

Dept. Agr. S. Australia, Bull. 80, 24 pp

Kerosene emulsion used as a dip will destroy both the lice and eggs on poultry. The application of kerosene 1 part and olive oil [illegible] parts is effective.

1904 Lawrence, W. H.

993 Three Common insect pests of Western Washington.

Wash. Agr. Exp. Sta. Bul. 65, 14 pp

Kerowater 20 to 35% and kerosene emulsion 1-6, 1-7 & 1-8 did not kill the eggs of the oyster shell bark louse. These were winter expts. Kerosene emulsion 1-9 or 10 will kill the young insects when crawling in the summer. It will not kill them after the scale starts to form. 10 & 15% kerowater was also effective on the young crawlers. Petroleum emulsion, kerosene emulsion and kero-water were partially effective on woolly aphids.

994
1913. Laws, H. E.

How ticks are killed when cattle are dipped.

Agric. Jl. of the Union of S. Africa, Pretoria, Vol. VI, No.2, pp.49-54.

Paraffin or kerosene is external in its action on ticks.

1902 - Lea, A. [illegible]

995

Remedies for insect and fungoid pests of the Orchard and Farm.

Pub. Dept. Agr. Tasmania.

The R & H formula for kerosene emulsion is given. This emulsion was recommenced for woolly [illegible], mussel scale and mites.

996
1918. Leach, B. R.

Experiments in the control of the root form of the woolly apple aphis.

U.S.Dept.Agric.,Bull.730, pp.24-40.

When kerosene emulsion is applied to the soil it disintegrates into its component parts; the first inch of surface soil retains the soap and some of the kerosene; the first 4 inches of the soil retains almost all the remainder of the kerosene. Kerosene emulsion did not kill the aphids at the lower soil levels.

997
1925 - Leach, B.R.
Control of Japanese beetle in lawns.

Penn. Dept. Agr.General Bul. 410; (Vol. 8, no.14) 12 p.

See Supplementary abstract

998
1921. Leak, W. N.

On the improvement of oiling fluids for anti-mosquito work.
Jl.Trop.Med.& Hyg.,Vol.XXIV,No.4,pp.37-40.

The addition of castor oil to kerosene makes for much better spreading than kerosene alone. 1% castor oil added to the kerosene increases the spreading 25 times. The film is not only active but also extremely tenacious. A wind will not break it. There is greater certainty of action. The addition of the castor oil tends to make the thickness of the film much more uniform.

1917 - Lees, A. H.
999
The raspberry and loganberry beetle.

Ann. Rept. for 1917. Agric & Hort. Research Sta., Long Ashton, Bristol, pp. 35-36

The following formula was used on the beetle with partial success. The soap, 20 lbs. was dissolved in 5-10 gals boiling water, and the kerosene 2 gals emulsified in it. Then 1/2

1000

Lees, A. H.
1917. Accessory wetting substances with special reference to paraffin emulsions.

Ann. Applied Biol. Vol. III, No. 4, pp.141-149;

See Supplementary abstract

1001
1918. Lees, A. H.

Nicotine-paraffin emulsion.
Jl.Bd.Agric.,London,Vol.XXIV,No.12,pp.1411-1415.
The following formula for nicotine and paraffin emulsion is given: Soft soap, 20 lbs., paraffin, 2 gals., nicotine, 1/2 lb., water, 100 gals. This is made by first dissolving the soap in 5-10 gals. boiling water. This emulsion has proved successful against capsids, cabbage caterpillars, and gooseberry sawfly.

1919 - Lees, A. H.
1002
Woolly Aphis of apple
Univ. Bristol: Ann. Rept. Agric. & Hort. Research Sta. Long Ashton, Bristol, 1919, pp. 46-47

The combined insecticide spray of nicotine kerosene emulsion containing: soft soap 15-20 lbs; kerosene ~~emulsion~~ 2 gals; nicotine 1/2 lb; water 100 gals is capable of killing the stem form even when no very high pressure is used.

1003
1913. Lesne, P.

Pour combattre les pucerons.

Jour.d'Agric.Pratique,Vol.77,T.26,p.124.

The R & H formula is given for petroleum emulsion for use on the aphis, diluted 1-25.

1004
1913. Lesne, P.

Contre les pucerons de fèves.
Jour.d'Agric.Pratique,Vol.77,T.26,p.252.
The following spray was used: Black soap, 1 kilog; sal soda, 1 kilog; petroleum 1-1/2 liters to 2 liters; water, 100 liters. The soap and soda are dissolved in 10 liters of water, and the petroleum added and agitated vigorously, finally add the remaining 90 liters of water.

1005
1918. Lesne, P.

Les insectes nuisibles aux arbres fruitiers.
Jour.de l'Agric.Pratique Vol.81,T.31,p.269-71.
The woolly aphis,(aerial form) may be treated in the winter with the following mixture: Black soap 1 kilog; petroleum 1 liter, water 10 liters. The soap is dissolved in a sufficient quantity of boiling water, then the petroleum is added and agitated with force to obtain a good emulsion. The remainder of the water is then added.

1006
1916. Le Prince, J.A. & Orenstein, A. J.

Mosquito control in Panama.

G. P. Putnam's Sons, New York and London.

Oil is the most commonly employed larvacide, and being generally applicable, is the most useful. Kerosene, crude oils of paraffin and of asphaltum base, and the various distillates have been used. Oils may kill the larvae (1) by a specific toxicity to the larvae; (2) clogging of the breating tube, and (3) reduction of the surface tension of the water. Kerosene was first used and later rejected for crude oil.

1007
1917. Levison, J.J.

Spraying Work of this Season.

Amer.Forestry,Vol.XXIII,No.280,pp.236-238.

For scale on dormant trees, use kerosene emulsion 1-10 or scalecide 1-15.

1904 - Lewis, E. L.
1008
Disinfecting power of coal tar dips

Oklahoma Agr. Exp. Sta. Bul. 62, 16 pp.

The disinfecting power of kerosene emulsion was determined along with several other coal tar dips. The emulsion did not prove effective. It was made according to the R & H formula, using hard soap.

1009
1914. Liceaga, Ed.

How war has been waged in Mexico against the mosquito.
Amer.Jour.Trop.Diseases and Prevent.Med.Vol. II,No.2,pp.118-123.
The larvae already formed can be destroyed by coating the water with petroleum. This prevents them from issuing forth to breathe the atmospheric air and thus poisons them.

1010
1926 Limburg, H.

Emulsions. I.

Rec. trav. chim. 45, 772-82.

1011
1926 Limburg, H.

Emulsions II. Rev. trav. chim. 45, 854-74
Ibid. 875-89.

Elec. charges on emulsion particles.

1012
1883 - Lintner, J.A.

1st Ann. Rpt. on the Injurious and Other Insects of the State of New York. 384 pp. (1882)

While most of the oils are deadly to insects, kerosene seems particularly so, perhaps from the rapidity with which it spreads over the surface of the insect, at once reaching and closeing the breathing pores and producing speedy death thru suffocation. There is a tendency for it to injure foliage. Reports have been made of its use without any injury. Kerosene and water will not mix unless constantly agitated. Kerosene has been used in many ways without applying it to vegetation; as a film on water and by saturating clothes with it, For lice on cattle, horses and hogs; for henneries infested with lice and mites, as a repellent for flies. Paraffin oil has been used as an insecticide in England. The oil was produced by distillation of Cannel Coal. This is taken from "A Manual of Injurious Insects with methods of prevention and remedy for their attacks to food crops, forest trees and fruits by Miss Eleanor A. Ormerod, 1881.

1013
1888. Lintner, J. A.

Some pests of the pomologist.

Rept.Amer.Pomol.Soc.1887,pp.101-110.

The R & H kerosene emulsion formula is given.

1014
1892. Lintner, J. A.

Kerosene emulsion.

Country Gentleman, Vol.LVII,No.2072,13 Oct., 1892,p.767.

The R & H formula for kerosene emulsion is given.

1015
1895 - Lintner, J.A.

The San Jose Scale and Other Destructive Scale Insects.
Bul. N.Y. State Museum, Vol. 3, no.13, pp.267-305.

A summer wash of an ordinary diluted kerosene emulsion applied three times at intervals during the summer will keep the insects from increasing .

1016
List, Geo. M.
1920.

Fruit tree leaf-roller, Archips argyrospila Walker.

11th Ann. Rept. State Entomologist of Colorado for the year 1919, Circ. 28, Aug. 1920.

Two types of miscible oils were used, one made from heavy oils having a paraffin base and the other from oils having an asphaltum base. A comparison of these oils were made. There were 17,232 eggs collected as check. Of these 12, 369 or 71.77% hatch. From 11 orchards sprayed with "Paraffin" miscible oil, 35,603 eggs were collected and 3,978 or 11.17% hatched An efficiency for these oils of 84.43%. From 8 orchards with "asphaltum" miscible oil, 20585 eggs were collected, 8,105 or 39.07% hatched, thus showing an efficiency of 45.13%. Eggs collected from an orchard sprayed with home made emulsion had an efficiency of 36.8%.

1017
List, G. M.
1920.

The European elm scale.

Office State Ent., Colorado, Fort Collins, Circ. 29, 1920, 12 P.

The use of miscible oil, 1-15 is the most effective means of control. The miscible oils are a high type of oil emulsion. They consist largely of mineral oils that have been so treated with an "emulsifier" that they mix readily with water. The miscible oils make a very satisfactory spray for elm scale as their oily nature causes them to penetrate the rough bark and masses of dead scales. Miscible oils should be used only during the dormant season.

1018
1900 - Lowe, V. H.

San Jose Scale Investigations II.
N.Y. Agric. Expt. Sta. Bul. 194, pp. 369-384.

See Supplementary abstract

1019
1901 - Lowe, V.H., & Parrott, P.J.

San Jose Scale Investigations.
III. New York, Agr.Expt. Sta. Bul. 202, pp.171-188.

Winter applications of a crude petroleum emulsion containing 25% and higher percentages of petroleum seriously injured or killed peach trees. European plum and apple trees were uninjured except by 40% or stronger emulsions. Cherry and pear trees were not injured by either the emulsified or undiluted petroleum. Spring applications resulted in serious injury to European plum trees by the undiluted petroleum, slight injury by the 60%, while the 40% was harmless. Peach trees were seriously injured by the 40% and stronger emulsions. Young (even) cherry and pear trees were uninjured by the diluted and undiluted petroleum. Hibernating scales were not killed by the 25%, while the 40% and higher percentages killed the scales in both winter and spring tests.

1020
~~1896 - Lowe, V.H. & Sirrine, F.A.~~

Report of the Entomologists.

N.Y. State Agric. Expt. Sta. Rpt., 1895; pp.549-633.

See Supplementary abstract

1021
1912 - Lockhart, L. B.

Analyses of kerosene.

N. Carolina Dept. Agr. Bul. Vol. 33, No. 6, 3 pp

Analyses of 30 samples of kerosene from 10 different companies are given. The flash (Elliott Cup) varies from 102 to 120. The Bé gravity from 42.4 to 48.3. The amt. distilling below 250 °C in per cent by volume varied from 65% to 89%. The residue (undistilled at 300°C) in per cent by weight varied from 1.5% to 9%.

1022
1900. Lockhead, W.

The San Jose and other scale insects.
Ontario Dept.Agr.,1900, 48 pp.

A report of Smith's work in N.J. Agr.Expt. Sta. Bul.138 is given for work with crude petroleum. Results are given for kerosene diluted with water. This was obtained from (Cornell) N.Y.Agr.Expt.Bulls.144 and 145. Also Gould, Cornell Bul. 177. Ohio Bull.103 by Webster is mentioned for diluted kerosene.

1023
1901. Lochhead, W.

Notes on insects.

Ontario Agr.Col.& Expt. Farm Rept.1900,pp.13-15.

Gasoline is recommended for the grubs of the Buffalo carpet beetle.

1024
1902. Lochhead, W.

Spray calendar.
Ontario Agr.Col.& Expt.Farm Bul.122, 12 pp.

The R & H formula for making kerosene emulsion is given and recommended for bark-lice and plant lice. The following formula is recommended for San Jose scale: Crude petroleum 2 gals., whale oil soap 5 lbs. dissolved in 1-1/2 gals. of boiling water. This is churned for 5 minutes or more and water to make 10 gals. is added.

1025
1902., Lochhead, W.

Report of professor of biology and geology.

Ontario Agr.Col.& Expt.Farms Rpt.1901, pp. 16-25.

The R & H formula is given. Dilute 1-9.

1026
1903. Lochhead, W.

The present condition of the San Jose scale in Ontario.
Ontario Agr.Col.and Expt.Farm Bul. 133, 8 pp.

The emulsions of crude petroleum and whale oil soap, although a very effective remedy, has never taken very well, on account of the difficulty which was found in making the emulsion and of the disagreeableness of the application.

1027
1904. Lochhead, W.

Injurious insects.

Ann.Rept.Dept.Agr.of Province of Ontario, 1903. pp.32-33.

The winter form of pear psylla being inactive, readily succumbs to a treatment of kerosene emulsion diluted from 7 to 9 times.

1028
1904. Lochhead, W.

The present condition of the San Jose scale in Ontario.
34th Ann.Rept.Ontario Ent.Soc.1903, pp.42-45.
Crude petroleum has been used in some districts with good results. The main objections to crude petroleum are: (1) the great variation in strength of the oil, (2) disagreeableness of application; (3) the great liability of its injuring plums and peaches.
The emulsion of crude petroleum and whale oil soap is very effective.

1029
1904. Lochhead, W.

Injurious Insects.

Ontario Agr.Col.& Expt.Farm Rpt.1903, pp.32-3.

Kerosene emulsion 1-7 or 9 and crude petroleum are used to destroy hibernating forms of pear psylla.

1030
1895 - Lodeman, E.G.

Spray Calendar.
Missouri Agric.Expt.Sta. Bul. 30.
Formula for making kerosene emulsion. Dissolve ½ lb. hard soap in 1 gal. boiling water, add 2 gals. of kerosene and churn with a pump for 5-10 minutes. Dilute 10 to 25 times before using. Use stronger emulsion for all scale insects.

1031
1895 - Lodeman, E.G.
Spray Calender.
N.Y.Cornell Agr Expt Sta.Circ.Febr. 1895- pp.85-92

The R & H Formula for kerosene emulsion is given using hard soap. For scale insects a dilution of 1-4 is recommended. For all other sucking insects use a dilution of 1-10 to 25.

1032
1899. Lodemann, E. G.

The spraying of plants.

Macmillan Company,N.Y. pp.79-84.

A general history of kerosene emulsion is given.

1033
1911. Lohrenz. H. W.

The woolly aphis, Schizoneura lanigera.

Jour.Econ.Ent.Vol.IV,No.2,p.162-3.

Kerosene emulsion,15% and 10%,was used on seedling apples. No injury resulted from its use and the aphis was greatly reduced.

1034
1895. Lounsbury, C. P.

A new greenhouse pest.

Massachusetts Agr.Coll.Rpt.1895,pp.111-132.

The Cook formula for making kerosene emulsion for use on the Orthezia insignis is given.

1035
1895 - Lounsbury, C.P.

Some Injurious Insects.
Mass. Agr.Coll. Hatch Expt.Sta. Bul. 28, 30 pp.
Kerosene emulsion was used on the imported elm scale. 1-9 was first used during May & June but with poor results. At the same strength late in fall poor results were obtained. It had to be increased to four times its strength before the insects succumbed. The following formula was used: Dissolve ½ lb. common bar soap in 1 gal of boiling water and add to it 2 gals. of kerosene. Churn the mixture thru a force pump until it emulsifies. For the greenhouse Orthezia Cook's emulsion was found very satisfactory.

1036
1902. Lounsbury, C. P.

Report of the Government Entomologist for the Year 1901.
Cape of Good Hope Dept.Agr.,Rpt.Gov.Ent. 1901. 103 pp.
The R & H formula for kerosene emulsion is given for use on white peach scale, but was not effective at dilutions of 1 2, 1-4, and 1-6. No foliage injury resulted. The same results were obtained for red scale with dilutions of 1-5, 1-7, 1-9 and 1-12. A 1-15 dilution was effective on woolly aphis.

1037
1918. Lounsbury, C. P.

Division of Entomology. Annual Report,1917-18.

Union S. Africa Dept.Agric.Rept.,Capt Town, 1918, pp.87-107.

The San Jose scale is being held in check by the use of miscible oils.

1038
1923 - Lounsbury, C.P.

Plant bugs as pests

Jour. Dept. Agri. Union S. Africa, Vol. VI, No. 2, P 114.

Kerosene emulsion will kill the plant bugs. The best method is to hand pick and place in a pail of water with kerosene floating on the water

1039
1923 Lounsbury, C. P.

Thrips injury to citrus trees.

Jour. Dept. Agri. Union S. Africa, Vol. 7, No' 3, P 243-249

This article gives the work of Jones in California. See Abst of Calif. monthly Bul. Jul. 1918

1040
1920 - Lovett, A.L.

Insecticide Investigations; Oregon Agric. Expt. Sta. Bul. 169 - 55. pp.

In preliminary tests of miscible oil emulsions as a spreader with lead arsenate, the oil showed considerable merit. It was efficient, cheap and easy to prepare. No bad effects followed its use in one season's tests.

1041
1921 - Lovett, A. L.,

Insect pests of truck and garden crops.
Oregon Agr. Coll. Extension Bul. 325,24 pp.

The R. & H. Formula for making kerosene emulsion is given.

1042
1923 - Lovett, A.L.

The Onion Maggott.

Oregon Agric. Expt. Sta. Circ. 37, 4 pp.

Onion thrips may be controlled by a 7% mixture using kerosene emulsion.

1043
1895 - Lowe, V.H.

A Lecanium Scale Infesting Plum trees in Western N. Y.
N. Y. State Sta., Rept. 1894, pp. 732 - 734.
Kerosene emulsion was made by dissolving ½ lb. hard soap in 1 gal. of boiling water; removing from fire and adding 2 gals. kerosene. This was agitated by pumping thru a force pump. It was used at strengths varying from 1-4 to 1-15 on the Lecanium scale on plum trees. It was applied as a spray. The results of the application ~~had~~ have not been determined.

1044
1897 - Lowe, V. H.

The Pistol-Case-bearer.
N.Y. Agric.Expt Sta.Bul. 122, pp. 221-232.

Kerosene emulsion at summer strength (1-10) has no effect on the pistol case bearer or the cigar-case-bearer.

1045
1902 - Lowe, V.H., & Parrott, P.J.

San Jose Scale Investigations.
IV. New York. Agr.Expt. Sta.Bul. 228, pp. 389 -456.

The formula for lime-water-kerosene wash is: Fresh lime 4 lbs; water 5 gals; kerosene 1 gal. The lime is slaked slowly with a small amount of water to obtain a creamy solution. Dilute to five gallons and add 1 gal. kerosene and churn until emulsified. When the mixture was applied, the oil separated from the water very quickly. The trees were uninjured and nearly free from scales. None of the materials tested ~~in~~ gave better results than the lime-sulphur-salt wash

1046
1897 - Lowe, V. H., & Sirrine, F.A.,

Report of the Department of Entomology.
N.Y.State Agric. Expt. Sta. Rpt. 1896; pp. 522-635.

Dipping the leaves of currants infested with the aphids in kerosene emulsion diluted 1-7 to 10 is the most practical method of destroying the aphid. Kerosene emulsion is a most satisfactory remedy for the Putnam scale when applied with a brush at full strength Kerosene emulsion 1-10 has no effect on either the pistol case bearer or the cigar case bearer. Kerosene emulsion is suggested for the woolly aphid.

1047
1893- Lugger, O.

The Classification of Insects and their relation to Agriculture.
Minn. Agr. Expt. Sta. Bul. 28, pp. 75-143.

Kerosene-oil has a greater range of usefulness than any other insecticide. It is not a poison but kills by contact. It is a very penetrating fluid and causes almost instant death. Since it kills plants as well as insects it cannot be used alone but has to be mixed with some substance that dilutes it without impairing its value as an insecticide. The Hubbard formula is given: Kerosene 2 gals., Common soap or whale oil soap ½ lb., water 1 gal.

Heat the solution of soap and water and add it boiling hot to the kerosene, churn the mixture with a force pump and spray nozzle for 5 or 10 minutes. Dilute before using 1-9. This emulsion is excellent when the water is soft. But with hard water Cook's formulae is equally as good and for some parts of Minnesota it is better. Kerosene emulsion is valuable against all kinds of leaf lice and most scale insects. For insects on domestic animals and mosquitoes

1048
1894 - Lugger, Otto.

The Chinch Bug.
Minn. Agr.Expt.Sta.Bul. 37; pp. 153-182.

If the migrating chinch bugs have reached the outer rows of corn and almost hide these plants by their presence, kerosene emulsion will prove effective. The emulsion should be well made by the Hubbard formula. Dilute 1-9 before using.

1049
1896 - Lugger, Otto.

Insects injurious in 1895.
Minn. Agr. Expt. Sta. Bul. 43, pp. 99-251.

The Hubbard formula for kerosene emulsion is given. It is recommended for cabbage butterfly larvae, plant lice and scale insects.

1050
1896 - Lugger, Otto.

Insects Injurious in 1896.
Minn. Agr. Expt. Sta. Bul. 48, pp. 31-270.

Kerosene emulsion as a sheep dip. The work of Prof. Gillette is given and an 8% oil is recommended. Kerosene and water mixture is advised for grapevine leaf hoppers. For the dog louse use kerosene emulsion to which is added an extract of Persian powder.

1051
1900 - Lugger, Otto.

Bugs injurious to our cultivated plants.
Minn. Agr. Expt. Sta. Bul. 69, 259 pp.

Kerosene emulsion is recommended for lice on domestic animals. Kerosene and benzine for bedbugs. Kerosene and water mixture for grape-vine leaf hopper. Kerosene emulsion for plant lice diluted about 10 times and also for scale insects with same dilution.

1052
1926. Mabery, Charles F.

"Saturation" of the petroleum lubricant hydrocarbons as shown by their reaction with bromine.
Jour.Amer.Chem.Soc.vol.48,No.10,pp.2663-4.

One atom of Br. replaces 1 atom of H forming 1 mol. of H Br and a bromine substitution product of the hydrocarbon oil. Petroleum lubricant hydrocarbons are not unsaturated oils.

1899 MacDougall, R. S.
1053

Insect attacks in 1898

Trans. Highland and Agri Soc. Scotland,
5 ser. Vol. XI, pp 287-293

The R & H formula is given for use on the black currant gall mite.

1054
1899. MacDougall, R. S.

Insect Pests of Domesticated Animals.

Trans.Highland and Agr.Soc.Scotland,5 ser., Vol.11,pp.162-204.

To clear animals of lice both biting and sucking, kerosene emulsion made by the R & H formula is used. Also Benzine, 1 part, soap, 6 parts, water 15 to 20 parts.

1055
1901. MacDougall, R. S.

Insect attacks in 1900.

Trans. Highland and Agr.Soc. Scotland,5 ser., Vol.13,pp.296-305.

The R & H formula for kerosene emulsion is recommended for the carrot fly. Kerosene in sand sprinkled around the onions will prevent the onion fly from laying their eggs near the onions.

1056
1905. MacDougall, R. S.

On Some Injurious Insects of 1904.

Trans.Highland and Agr.Soc.Scotland, 5 ser., Vol.17, pp.212-228.

Kerosene in sand will act as a deterrent to the cabbage root fly at the time of egg laying.

1057
1905. Macdougall, R. S.

The bulb mite.

Jour.Bd.Agr. (London),Vol.XI,No.12, pp. 748-751.

Spraying with paraffin is one treatment for the bulb mite.

1906 - MacDougall, R. S.
1058

[illegible]

A useful measure [illegible] spray the carrot [illegible] sion again after [illegible] after thinning.

1908 - MacDougall, R.S.
1059

[illegible]

1060
1913. MacDougall, R. S.

Insect Pests in Scotland in 1912.

Trans.Highland & Agric.Soc.of Scotland,5th ser.,Vol.XXV,pp.192-208.

Chermes of the silver fir may be controlled in the nursery by using kerosene emulsion. 3 lbs. soft soap is dissolved in 2 quarts of boiling water and 1 pt. of kerosene is added and then churned to a creamy mass. This stock is diluted with 5 gals. of water before using.

1061
1917. MacDougall, R. S.

Insect & Arachnid Pests of 1916.

Trans. Highland & Agric. Soc.Scotland,5 ser., Vol.29, pp.116-152.

Paraffin emulsion or jelly is recommended for the mealy plum aphid. Paraffin, 5 gals. and soft soap, 8 lbs., are boiled together and 1 pt. of water is added and stirred well. This forms a jelly on cooling. 10 lbs. are used to 40 gals. of water for spraying.

1062

Macfie, J.W Scott
1916-17. The limitations of kerosene as a larvacide, with some observations on the cutaneous respiration of mosquito larvae.
Bul. Ent. Res. Vol. 7, Pt. 3, pp.277-295.

See Supplementary abstract

1063
1903. MacIntosh, R.S.

Notes on some of the insects and fungous diseases affecting horticultural crops.

Alabama Agr.Expt.Sta.Bul.124,pp.84-104.

The R & H formula is given.

1064
1922. Mackie, D. B.

Vacuum fumigation.

Mthly.Bull.Cal.Dept.Agric.,Vol.XI, No.8-9,pp. 698-703.

Trees with a peach borer infestation were dipped in a miscible oil diluted 1-12 and the water was drawn off by vacuum. The oil remained in the burrows and no insects survived the treatment.

1900 - MacMahon, P.
1065
Memo. of insect and fungus remedies
Queensland Agr. Jour. Vol.6, no. 2, pp. 118-119

The R & H formula is given. Dilute 1-9 before using on scale.

1066
190[illegible]. Macoun, W. T.

Report of the Horticulturist. Sprays and spraying mixtures.

Canada Expt.Farms Report 1905,pp.112-14.

See F. T. Shutt, same reference, pp.149-154, for kerosene emulsion formulas.

1067
1909. Macoun, W. T.

Spraying.

Canada Expt.Farms Rept.1909,pp.124-126.

The following spray formula was used on apple aphis: 5 lbs.flour, 4-1/2 gals. kerosene and 36 gals. water. Only fair results were obtained from its use.

1068
1910. Macoun, W. T.

Spraying.
Canada Expt.Farms Repts.1910,pp.150-154.
The following kerosene emulsion sprays were used for aphids on nursery apple stock: (1) 4-1/2 gals. kerosene, 5 lbs. flour, 36 gals. water. (2) 3 gals. kerosene, 12 ozs. Takanap soap, 40 gals. water. Neither formula was a complete success against the aphis.

1069
1919. Macrum, C. A.

Combined Bordeaux Oil emulsion spray.
15th Bien.Rpt.Bd.Hort.Oregon 1917-18, p. 82.
The regular Bordeaux mixture was prepared. Then 1-1/2 gals. glue solution and 12 gals. of oil emulsion were added. This was sufficient for 200 gals. spray. The Bordeaux mixture must be neutral before the oil is added.- The mixture was effective against anthracnose.

1070
1920. Macrum, C. A.

Combined Bordeaux oil emulsion spray.
Better Fruit,Vol.14,No.8,p.9, 39.
The Bordeaux mixture is prepared in the usual way; 12 gals. of General Chemical Co's. No. 1 oil emulsion is then put into the tank. This amount is used for a 200 gal. tank. The spray should be used as soon as prepared. It is necessary that the Bordeaux mixture be neutral.

1913. Major, H. S.
1071 The maggot fly pest in sheep
Agric. Gaz. N.S.W. Sydney, Vol. XXIV, No. 8 pp. 645-652

Kerosene has no immediate effect upon the maggots if they can get away after immersion.

1072
1908. Mally, C. W.

Paraffin remedy v. poisoned bait for the fruit fly.

Agr. Jour. Cape.Good Hope,vol.32,No.5,pp. 609-614.
The kerosene failed as an attractant for fruit flies in comparison with other substances.

1073
1902 - Mally, F.W.
Insect Pests attacking truck crops.
Texas Agr. Expt.Sta. Bul. 64, 18 p.

The R & H formula for kerosene emulsion is given. Whale oil soap is preferred for this emulsion.

1074
1924. Mañalac, San Juan, J.

Prays citri, Milliere, a rind insect pest of Philippine oranges.
Philipp.Agriculturist,Vol.XII,No.8,pp. 339-348.
Oil emulsion was found to be effective in killing the insect in the pupal stage.

1075
1902. Mann, H. H.

The mosquito blight of tea.

Planting opinion, Vol.7, No.50,pp.847-851.

The R & H formula for kerosene emulsion is given.

1902 Mann, H. H.
1076 The"mosquito blight" of tea

Indian Tea Assn. Pubn. 3, 14 Pp 1.

The R. & H formula for kerosene emulsion was used successfully for the mosquitoes on tea.

1077
1902. Mann, H. H.

The mosquito blight of tea.

Indian Tea Assoc.,Calcutta,1902, 14 pp.

The R & H formula for kerosene emulsion is given.

1078
1904. Mann, H. H.

The "mosquito blight" of Tea.

Indian Tea Assn.Pubn. 7, 20 pp.

The R & H kerosene (1-10) emulsion was very satisfactory in its results.

1079 1904. Mann, H. H.

The"mosquito blight"of tea. II.

Indian Tea Assoc., Calcutta, 20 pp.

Kerosene emulsion for use on the tea was made by the R & H formula.

1080
1905. Mann, H. H.

Mosquito blight of tea.

Indian Tea Assoc. (Pamphlet) 1, 19 pp.

The kerosene emulsion used in the spraying of the tea was made by the R & H formula.

1081
1905. Mann, H. H.

The "mosquito blight" of tea.

Indian Tea.Assn.Pubn.10, 19 pp.

The R & H kerosene emulsion (1-10) was very effective for the mosquito blight.

1921 Marcovitch, S.
1082 The Potato leaf-hopper and tarnished plant bug in 1916.

Jour. Econ Ent., vol. 14, no.1, pp. 61-62.

Kerosene emulsion (1-10, 1-15) uneffective; 1-2 dilution or pure kerosene was effective and did not injure the vines.

1083
1894. Marlatt, C. L.

Notes on insecticides.
Insect Life, Vol. VII, No. 2, pp. 115-125.
Experiments were made with kerosene emulsion at 1/3, 1/5, 1/10 and 1/15 strength on the foliage of peach, Japan quinch, elm, pine and strawberry. No injury resulted from the use of the emulsion except on the quinch with the 1/3 and 1/5 strength. Little danger attends the proper application of a well made emulsion and much stronger mixtures may be used than hitherto advised. Winter applications of kerosene emulsion diluted 5 times, diluted 2-1/2 times, undiluted emulsion and pure oil showed no injury to the trees and all were effective on scale except the emulsion diluted 5 times, which killed no scale.

1084
1894. Marlatt, C. L.

The pear-tree psylla in Maryland.

Insect Life, Vol. VII, No. 2, pp. 175-185.

Experiments with milk and whale-oil soap kerosene emulsion diluted with 9 and 7 parts of water. From 75 to 95% of the eggs were killed with the 7 times diluted emulsions, and more than half as many with the 9 times diluted.

1894 Marlatt, C. L.
1085 Important Insecticides

U.S.D.A. Farmers' Bul. 19, 20 pp

The regular kerosene emulsion formula is given; also the sour milk formula

1086
1895 - Marlatt, C.L.
Notes on insecticides.
USDA Div. of Ent. Bul. 2 (n.s.) pp. 19-26.

Tests were made with a kerosene and water pump to determine the % of oil sprayed when the gauge was set at a different positions. The % oil obtained was always below that which should have been given.

1087
1895 - Marlatt, C.L.

The pear-tree psylla.

U.S.D.A. Bur. Ent. Circ. 7 (2nd ser) 8 pp.

Kerosene emulsion diluted 1-9 is recommended.

1088
1895 Marlatt, C.L.

Insect Life, Vol. 7, No. 5, p. 372

Kerosene emulsion against San Jose Scale infesting peach.

1896? Marlatt, C.L.
1089

U.S. Dept. Agr. Div. Ent. Bul. 6, n.s., p. 71

Kerosene against San Jose Scale on peach trees.

1090
[illegible]. Marlatt, C. L.

The principal insect enemies of the [illegible].

U.S.D.A. Y[illegible] 1[illegible]5., pp. 3[illegible]-404.

Kerosene emulsion diluted 1-9, poured about the base of a grape vine is very effective for the [illegible] of the grape vine Fidia.

1091
1897- Marlatt, C. L.
Notes on Insecticides.

USDA Div. Ent. Bul. 9 (n.s.) p. 54-63.

Pure kerosene sprayed on plants did not cause injury. Kerosene mixed with water was not as effective as kerosene emulsion made with soap. The favorable use of kerosene on the Pacific coast is discussed. This paper is a resume of former work.

1092
1897 - Marlatt, C.L.
The Clover Mite.

U.S.D.A. Div. Ent. Circ. 19, (2 ser) (2 ed)
4 pp.

Dormant spraying with kerosene emulsion is effective against the clover mite eggs.

1897 - Marlatt, C.L.
1093
The Woolly Aphis of the Apple.

U.S.D.A. Bur. Ent. Circ. 20, (2nd Ser). 6 pp.

Kerosene emulsion 1-15 is recommended.

1094
1897. Marlatt, C. L.

Insect control in California.
[illegible], 1896, pp. 217-36.
Kerosene emulsion made by using 35 gals. of whale oil soap, 100 gals. of kerosene and 50 gals. of water was used on lemon trees with but very little injury. The emulsion was diluted 1-7 before using. This formula was used by Mr. Frank Kahles, who was formerly connected with a royal garden in Bavaria. He states that kerosene emulsion was used thirty years [illegible] Herr Schoenfeldt, the head gardner in the establishment. Soap was dissolved in hot water, kerosene [illegible], and the whole agitated for 15 to 20 minutes [illegible] emulsion formed. It was used as a wash [illegible].

1095 1898 - Marlatt, C.L.
The peach twig borer.
USDA Div. Ent. Bul. 10, n.s. pp. 7-20.

Spraying the trees during Jany. and Febr. with kerosene emulsion which will penetrate the furrows and destroy the young larvae is an effective method of control.

1096
1898. Marlatt, C. L.

The periodical cicada.

U.S.D.A. Bur. Ent. Bul. 14, n.s., 148 pp.

Kerosene emulsion was used to destroy the emerged pupae and adults at dilutions of 1-1 to 1-5. The emulsion stopped all molting or transformation.

1898 - Marlatt, C.L.
1097 Notes on Insecticides.

USDA Div. Ent. Bul. 17, n.s. pp. 94-98.

This is a resume of results thus far obtained with kerosene. This oil may be used with little if any danger to plants and with satisfactory results on the scale. Peach trees are very apt to be injured.

1898. Marlatt, C. L.
1098

The Principal insect enemies of the grape

U.S.D.A. Farmers' Bul. 70, 22 pp

For the grapevine fidia a safe and a very effective remedy if applied before the end of June, or before the larvae have scattered is to wet the soil about the vines with a solution of kerosene emulsion diluted 1-9.

1898 Marlatt, C. L.
1099
The peach twig-borer

U. S. D. A. Farmers' Bul. 80, 16 pp.

Spraying the trees with kerosene emulsion made by the R. & H formula, during Dec. or Jan. or any other oily substance which will penetrate the burrows and destroy the larvae.

1100
1900. Marlatt, C. L.

How to control the San Jose scale.

U.S.D.A. Div. Ent. Circ. 42, 6 pp.

Pure kerosene oil may be used as a winter treatment. Crude petroleum oil may be used in the same way as the kerosene. Kerosene and crude petroleum may be used as a mechanical mixture with water.

1101

1901. Marlatt, C. L.

Some insecticide experiments.
U.S.D.A.Bur.Ent.Bul.30,n.s., pp.33-39.

A series of plum, apple and pear trees were sprayed with crude petroleum and refined petroleum (kerosene) on a bright dry day. No injury resulted from their application and all the scale was killed. Bordeaux mixture 5 gals. and kerosene 1 gal. were churned together until the oil was emulsified. No injury to the trees was noted nor to the scales. Kerosene-lime was also tried on a small way. No definite results can be stated.

1901, Marlatt, C. L.

1102

Important insecticides; directions for their preparation and use.

U.S.D.A. Farmers' Bul. 127, 41 pp

Pure kerosene has proved very effective as a remedy for mosquitos. Pure kerosene and pure crude petroleum have been used on plants as a winter wash for San Jose scale. The R & H formula for making the kerosene emulsion using whaleoil soap is given. A distillate emulsion formula is given, using more soap and one-half as much oil as the kerosene emulsion The kerosene-sour milk formula is also given.

1103

1901. Marlatt, C. L.

Scale insects and mite enemies of citrus trees.
U.S.D.A. Yearbook 1900, pp.247-290.

The distillate and kerosene emulsion sprays are most widely used for scale insects on citrus trees. The distillate emulsion is made by using 5 gals. 28° gravity, untreated distillate, 5 gals.water boiling, 1-1/2 lbs.whale oil soap. For use, this is diluted with from 12 to 15 parts of water. The kerosene emulsion is made by the R & H formula. In making these emulsions, it is advisable to first break the water by adding a little lye, 1/4 lb. to 50 gals. of water.

1902? Marlatt, C.L.

1104

U.S. Dept. Agr. Div. Ent. Bul. 4 n.s. p. 69

Naptha against clothes moths

1105

1902 - Marlatt, C.L.
How to control the San Jose scale.

U.S.D.A. Bur.Ent.Circ. 42, (2nd ser.rev). 6 pp.

Kerosene, crude petroleum and these two mixed with water are recommended as winter washes. Crude oil should have a sp.gr. of 43°Be.

1902? Marlatt, C.L.

1106

U.S.Dept.Agr. Div.Ent. Circ. 47, p.7

Kerosene against Bed Bug

1107 1903 - Marlatt, C.L.
How to control the San Jose scale.
U.S.D.A. Bur. Ent.Circ. 42, (3rd Ed.) 7 pp.

Kerosene used pure, diluted with water or in an emulsion with soap according to R & H formula are recommended for the scale. Crude petroleum and a mixture with water is also given. A petroleum soap emulsion is made according to the R & H formula for kerosene.

1903, Marlatt, C. L.

1108 Scale insects and mites on citrus trees.

U.S.D.A. Farmers' Bul. 172, 42 pp.

The oily washes are best for use on citrus trees trees against scale insects. The distillate emulsion is made by the following formula: Five gals. 28° Baume untreated distillate; 5 gals. water, boiling; 1-1/2 lbs whale oil soap. For use on lemon trees The emulsion is diluted 1-12; for orange trees, diluted 1-15. Kerosene emulsion is made by the R & H formula, and is used at the same strength as the distillate emulsion.

1109

1904 - Marlatt, C.L.
The new distillate spray in California.

USDA Div. Ent. Bul. 44; pp. 60-61.

The process consists of putting the oil and water together in the spray tank which has a capacity of 200 gals. The oil is thoroly emulsified with the water by means of a rotating agitator in the tank operated by a gasoline engine. This will remain stable for several hours.

1110

1906 - Marlatt, C.L.

The San Jose or Chinese scale.
USDA Bur. of Ent. Bul. 62, 89 pp.

Kerosene either pure or in a mechanical mixture with water, or as an emulsion with soap; crude petroleum, either pure or in a mechanical mixture with water or as an emulsion with soap are recommended for the control of this scale under certain conditions.

1111

1906 - Marlatt, C.L.
How to control the San Jose scale.

U.S.D.A. Bur. Ent. Circ. 42, (2nd Ser.4th Ed) 8 pp.

Marlatt, C.L.
See 3rd edition of this circular 1903.

1907 - Marlatt, C. L.

1112 The Periodical cicada.

USDA Bur. of Ent. Bul. 71; 181 pp.

Kerosene emulsion used in a very strong solution (1-1 up to 1-3) destroys the emerged pupae and adults . The emulsion stops all molting and transformation.

1113

1907. Marlatt, C. L.

The bedbug.

U.S.D.A.Bur.Ent.circ.47, Revised ed. 8 pp.

Liberal applications of benzine or kerosene or any of the petroleum oils is recommended.

1114

1909 - Marlatt, C.L.
How to control the San Jose Scale
USDA Bur. Ent.Circ. 42; (5th Ed). 7 pp

Miscible oils are recommended in addition to those oils of the 3rd edition, 1903, of circ. 42.

1115

1910 - Marlatt, C.L.
The horn fly
U.S.D.A.Bur. Ent. Circ. 115; 13 pp.

Kerosene emulsion made by the R & H formula or petroleum emulsion made in the same way are effective remedies for the horn fly.

1116

1916. Marlatt, C. L.

House ants: Kinds and Methods of Control.

U.S.Dept.Agric.Farmers'Bull.740, 12 pp.

When an ant's nest is located, the inmates may sometimes be reached by injecting a little kerosene or gasoline in opening by means of an oil can.

1117

1916. Marlatt, C. L.

The bed bug.

U.S.D.A.Farmers' Bull.754, 12 pp.

The most efficient of remedies is the application of benzine, or kerosene or any other of the lighter petroleum oils, introduced with small brushes into all crevices of beds, furniture or walls where the insects may have concealed themselves.

1901, Mason, F.

1118 Pure kerosene for San Jose scale

Agr. Gaz. N.S.W. Vol. 12, No. 2, p. 236

Pure kerosene painted on apple trees completely killed the scale without injury to the tree.

1119
1901. [illegible], W. J.

The fight against mosquitoes.

Rural New Yorker, Vol.60, No. 2[illegible]1, p.417.

A film of kerosene on the pools of water was used to kill mosquito larvae.

1120
1920. Mathieu, E.

Some trials of food plants in the economic gardens, II.
Gardens' Bull., Straits Settlements, Singapore, Vol.II, No.7, pp.238-245.
Petroleum emulsion has been used with but partial effect on bean pests.

1121
1897. Matsumara, M.

Pear borer.

Annot.Zool.Japan, Vol.1, 4 pp.

Kerosene emulsion is very beneficial after pruning as well as in early June, namely the time of larvae hatching, for it kills at the same time the larvae of the leaf roller.

1122
1897. Matsumara, M.

The pear borer.

Jour.Roy Micros.Soc. No.5, p. 379.

See original in Annot.Zool.Japan, Vol.1, 4 pp. by Matsumara, M

1123
1917 - Maulik, S.
Solubility of the scale of Lepidosaphes ulmi, Linn.

Bull. Entom. Research, Vol. VII, No. 3 pp 267-269

Paraffin emulsion has been found useful as a to a certain extent. This may be attributed to the purely physical action of the paraffin owing to its low surface tension. Kerosene emulsion used in the spring on trees which [illegible] newly hatched insects checks their spread.

1124
1901. Maxwell-Lefroy, H.

Thrips on cacao trees.

West Indian Bul., Vol.2, No.3, pp.175-190.

The R & H kerosene emulsion formula is given.

1125
1903. Maxwell-Lefroy, H.

Crude oil and soap, a new general insecticide.
West Indian Bul., Vol.3, No.4, pp.319-326.
The crude oil obtained in the Barbados would not emulsify in the ordinary way. The following gave a good emulsion: 10 lbs. whale oil soap, 5-1/2 pts. of oil (Barbados oil), 4 oz. naphthalene. The Naphthalene was dissolved in the oil and then the oil and soap were mixed. This diluted well with water and no oil separated out.

1126
1906. Maxwell-Lefroy, H.

The treatment of brown bug of coffee.

The Agric.Jour.of India, Vol.1, Pt.1, p.77-8.

The use of crude oil emulsion was reported as a failure for the brown bug.

1127
1906. Maxwell-Lefroy, H.

The mango weevil.

The Agric.Jour.India.Vol.1, pt.2, pp.164-165.

The weevil remains on the tree from one season to the other. It is only necessary to paint or scrub down the bark with kerosene to destroy the insect.

1128
1915. Maxwell-Lefroy, H.

Insecticides.

Ann App.Biol.Vol.I, No.3 & 4, pp.280-298.

Kerosene was used in [illegible] emulsion with soft soap or kerosene stirred up in water for garden pests.

1129
[illegible]. Maxwell-Lefroy, H.

The control of flies and vermin in Mesopotamia.

Agric.Jl.of India, Vol.XI, Part 4, pp.323-331.

Crude oil emulsion is used for vermin and sand flies.

1130
1891. Maynard, S. T.

Fungicides and insecticides on the apple, pear, plum and grape.
Massachusetts (Hatch) Agr.Expt.Sta.Bul. 11, pp.12-21.
Kerosene was used for the plum wart with success. Some injury resulted from its use.

1131
1892 - Maynard, Samuel T.
Experiments with Fung[illegible] and Insecticides and with Or[illegible] and Grapes.
[illegible] Sta. Bul. 17, pp.11-32.
Kerosene emulsion formula:- [illegible] of common yellow or [illegible] boiling water to which [illegible] the whole churned [illegible] This is diluted 1-9 and [illegible]

1132
[illegible]
[illegible]ides & Insecticides.
Mass.Agr. Coll. Hatch Expt. Sta. Bul. 25, 18 pp.

Kerosene emulsion formula: ½ lb. common hard soap dissolved in 1 gal. of hot water. Pour in 2 gals. of kerosene and stir or churn with syringe or hand pump until the mixture forms a smooth buttery paste. Dilute with water to from 15 to 25 gals. This is used for pear psylla. The best time for applications is from May 1st to June 1st.

1133
1895 - Maynard, Samuel T.
Fungicides, Insecticides and Spraying Calendar
Mass. Agr. Coll. Hatch Expt. Sta. Bul. 29, 11 pp
Kerosene emulsion formula. Dissolve ½ lb. common bar soap in about 2 gals. of hot water. Pour into this 2 gals. of kerosene and with a hand pump, pump back and forth until a thick butter-like substance is formed. Before using add water enough to make (A) 10 gals. of emulsion; (B) [illegible] gals. of emulsion. This is recommended for pear tree psylla and black peach aphis.

1134
1899 - Maynard, S.T.
Insecticides and Spraying Calendar
Mass.Agr. Coll. Hatch Expt. Sta. Bul. 60.
Formula for kerosene emulsion: ½ lb. common bar soap dissolved in about 2 gals. of hot water. While still hot pour in 2 gals. of kerosene and with a hand pump, pump it back and forth until a thick cream-like substance is formed. Before [illegible] make (A) 10 gals. of emulsion (B) [illegible] of emulsion. Use A when insects are in large numbers

Pure kerosene mixed with water if applied upon a bright clear day and in a fine mist so as not to form drops may be used without injury to the foliage of most trees attacked by aphids and other sucking insects including the pear tree psylla and scale insects.

1135
[illegible] - [illegible], S. T., & Drew, Geo. A.
Spraying Crops.
Mass. Agr. Coll. Hatch Expt. Sta. Bull. 73, pp. 9-15
Kerosene and soap solutions applied in a fine spray or mist or in water were used for aphids, scales and other insects that feed by sucking the juices of plants.

1136
1920. Mayne, J.F. & Jackson, W. R.

Larvicides.

Jl.R.A.M.C., London, Vol.XXXIV, No.2, pp.112-120.

Kerosene oil was very effective on culex larvae. When the kerosene was thoroly mixed with the water, better results were obtained than when only the kerosene was floated on the water.

1911. McClintock, C. T., Hamilton, H. C., & Lowe, F. B.

A further contribution to our knowledge of insecticides.

Jour. Amer.Pub.Health Assn.Vol.I, o.s.Vol.VII, No. 4, p.2[illegible]-2[illegible].

The value of kerosene is limited because it leaves an oily deposit when volatilized in any quantity and also because of its inflammable nature.

1138

1911. McColloch, J. [illegible]

A preliminary Report on the life-economy of Solenopsis molesta, Say.- Jour. Econ. Ent., vol. 9, no. 1, pp. 23-28.

Kaffir seed dipped in kerosene was fairly repellant to ants but only 10 o/o of seeds germinated.

1139

1922. McColloch, J.W., & Hayes, W.P.

The reciprocal relation of soils and insects.

Ecology, Vol.III, No.4, pp.288-301.

Reference to Alwood's experiments with kerosene emulsion against the grubs of Cotinis nitida.

1140

1912. McCoy, G. W.

Notes on mosquito eradication.

Pub. Health Rept.Vol.27, No.26, p.1029-1034.

Both crude and refined petroleum was used. Crude petroleum lacked the tendency to spread over the surface of the water. Refined petroleum was much better. Oil should be used only on temporary collections of water.

1141

1920 - McDaniel, Eugenia.

Termites in Buildings.

Quarterly Bull. Mich Agric.Coll. Expt.Sta. Vol. II, No. 3, page 124.

Where it is impossible to remove timbers in buildings, drill holes in them and inject kerosene into the cavities

1142

1919. McDonald, R. E.

The stable fly.

Texas Agric.Dept.Mthly.News Bull., Vol.II, No.3, p. 3.

The R. & H formula for kerosene emulsion is given. 1 lb. of tobacco boiled down was added. This spray was recommended for the stable fly.

1143

1900. McDougall, R. S.

Insects attacks in 1899.

Trans. Highland and Agr. Soc. Scotland, 5, Ser., Vol.12, pp.295-307.

Paraffin (kerosene) emulsion made by the R & H formula was very effective on the genus Chermes on spruce, larch and pine when diluted 1-8 & 1-10.

1144

1912 - McGregor, E.A.

The red spider on cotton.

U.S.D.A. Bur. Ent. Circ. 150 : 13 pp.

Miscible oil 1-20 was effective on the red spider eggs.

1145

1913. McGregor, E. A.

The red spider on cotton.

U.S.D.A.Bur.Ent.Circ.172, 22 pp.

Miscible oil 1-20; miscible oil, 2-1/2 gals., and Black leaf, 40, 26 ozs. to 100 gals. water were very satisfactory sprays for this insect.

1146

1916. McGregor, E. A.

The red spider on cotton and how to control it.

U.S.Dept.Agric.Farmers'Bul. 735, 12 pp.

Kerosene emulsion may be used effectively against the red spiders.

1147

1917. McGregor, E.A. & McDonough, F.L.

The red spider on cotton.

U.S.Dept.Agric.Bull.416, 72 pp.,

A miscible oil diluted 1 - 20 or 1 - 30, sufficed to kill all red spiders and no injury to cotton foliage resulted. Kerosene emulsion 1 - 6 was effective against the red spider on cotton and bean. A weak solution of kerosene emulsion when fortified with a small amount of a miscible oil, did not give satisfactory results.

1148

1917. McKay, J. W.

Ann.Rept.of the Karimganj Agric.Expt. Sta.for the year ending the 30th June, 1917.

Ann.Rept.Agric.Expt.& Demonstrations in Assam for the year ending 30th June, 1917. pp. 68-82.

Kerosene water traps were used for the stem borer moth.

1149

1920. McLennan, A. H.

Spraying vegetables.

Canadian Hort. & Beekeeper, VOL. XXVIII, No.4, pp.107-108.

Kerosene emulsion was used on onion thrips, but results were not satisfactory.

1150

1920. McLennan, A. H.

Report of the vegetable specialist for 1919.

15th Ann.Rept.Ontario Veg.Growers' Assoc., 1919, pp.14-16.

Kerosene emulsion did not give satisfactory results on onion thrips.

1151

1924. McLeod, G.F.

The fruit tree leafroller in New York.

Proc.69th Ann.Meeting N.Y.State Hortic. Soc., pp.95-104.

The treatments with oil sprays were made the latter part of April just as the buds were swelling. The oils delayed the hatching of the egg masses two weeks after the unsprayed eggs developed. There was considerable curtailing of the foliage damage due to larval feeding where miscible oils had been used. From the control standpoint a miscible oil should possess the ability to penetrate the protective coat of the egg masses used at a strength which would not produce injury to the trees and at the same time not be excessive in cost.

1152

1919. McSwiney, J.

Rept.Agric.Dept., Assam, for the period from July 1, 1918, to March 31, 1919. Shillong, pp.6-8.

The mustard sawfly was checked by dusting with a mixture of powdered soil and lime sprinkled with kerosene.

1153

1921. McSwiney, J.

Entomology.

Report of the Agric.Dept., Assam, for the year ending 31st March 1921, Shillong, pp.7-8. sec.3.

A film of kerosene on the water was effective for paddy pests.

1154

1926 Mead Brian and J.T. McCoy

Emulsification. I. A study of oil-soluble emulsifying agents.

4th. Colloid Symposium Monograph 1926, pp. 44-5[illegible].

1155

1903. Mead, H. O.

Clear kerosene for insect pests.

Rural New Yorker, Vol.LXII, No. 2800, p.[illegible].

Pure kerosene was sprayed on some trees in foliage for the scurfy bark louse. No injury resulted from the use of kerosene and the bark louse was killed

1156
1906 - Melander, A.L.
Two insect pests of the elm.
Wash. Agr. Expt Sta. Bul. 74, 7 pp.

The R.& formula for kerosene emulsion is given for use on the elm leaf louse.

1157
1913. Melander, A. L.

Crude oil emulsion for winter spraying.

Northwest Hort. 26th yr. No. 11, Nov. 1913, p. 268.

Crude oil emulsion is made by the following formula: 20 lbs. fish oil soap, 4 lbs. of 98% lye, 20 gals. of crude oil + the ingredients made up to 200 gals, with water.

1158
1914. Melander, A. L.

Crude oil emulsion for winter spraying.
Better Fruit, Vol. IX, No. 4, Oct. 1914, p. 19.
The crude oil emulsion is made by dissolving 20 lbs. whale oil soap in 25 gals. hot water. 4 lbs. of 98% lye is then dissolved in a couple of gallons of water, added to the soap, and enough water run in to make the full amount up to 177 gallons. The agitator in the spray tank is started running and 20 gallon of crude oil completes the formula.

1159
1914 - Melander, A.L.
Winter sprays: Sulphur lime wash and crude oil emulsions.
Wash. Agr. Expt. Sta. Popular Bull. 64; 8 pp.

Formula for crude oil emulsion is: Emulsifier:

Lye	3 lbs.
Hot water	10 gals.
Fishoil soap	20 lbs.
Crude oil	20 gals.
Water to complete	200 gals.

The lye should be dissolved in the hot water, after which the fishoil soap should be dissolved. This emulsifier is added to the tank containing 167 gals. of water, and the agitator run at full speed. The oil is then poured in slowly while the agitator churns the mixture into a brown colored liquid which contains 10% crude oil.

1160
1915. Melander, A. L.

Varying susceptibility of the San Jose scale to sprays.
Jour. Econ. Ent. Vol. 8, No. 5, pp. 475-480.

Several proprietary oil sprays gave much more rapid and effective results than lime-sulphur.

1161
1919 - Melander, A.L.
Division of Zoology & Entomology.

28th Ann. Rept. 1917-18; Wash. State Coll. Agr. Expt. Sta. Bul. 153; pp. 34-38.

The highest grade of miscible oil used at 5% strength proved much quicker acting and more efficient than the customary polysulphid sprays.

1162
1920. Melander, A. L.

Some observations on orchard sprays.
Rept. Proc. 15th Ann. Meeting Washington State Hortic. Assoc., 1919. pp. 40-46.
Fruit growers have not used oil sprays for the following reasons: (1) It is next to impossible to buy crude oil on the market in order to make oil emulsions at home; (2) Prepared oil sprays cost too much; (3) Oil sprays are not yet standardized and are, therefore, not reliable; (4) Oil sprays will not emulsify with some kinds of water; (5) Oil sprays will harm fruit trees; (6) Some fruit growers have tried oil and have had more scale than ever before.

1163
1922 - Melander, A.F.
Rept. of the Div. Ent. & Zoology.
31st Ann. Rept. Wash. Agr. Expt. Sta. Bul. 167, pp. 24-28.
Oil sprays are more rapid in action on San Jose scale than sulphid sprays, there is much variation in miscibility and efficiency among commercial oils. Orchard leaf roller eggs are very resistant to oil sprays.

1164
1922- Melander, A.L.
Division of Entomology.
32nd Ann. Rept. Wash. Agric. Expt Sta. 1921-22. Bul. 175, pp. 21-25.
Some brands of miscible oil are less effective on San Jose scale than others, due either to insufficient heavy oil or insufficient emulsifying agents in their composition. Oil sprays give the greatest promise for controlling the leaf roller. A 10% oil appears to be the best.

1165
1923 - Melander, A. L.
Tolerance of San Jose scale to sprays.

Washington Agric. Expt. Sta. Bul. 174; 52 pp.
Spraying experiments were conducted from 1908 to 1922 with lime sulphur and other polysulphide sprays and with oil sprays. It was found that good emulsions based on crude oil were quicker and more dependable for San Jose scale than sprays based on sulphur. Miscible oils under a given name vary in composition, in physical properties and in insecticidal effect. Well emulsified oils, used as a late dormant spray should be safe on trees. Fall spraying is not recommended because of the possibility of injury due to freezing. Emulsions based on wood distillation products instead of crude petroleum oil have little insecticidal value.

1166
1924 Melander, A.L.

The preparation of oil sprays. Proc. Wash. State Hort. Assn., 1924, pp. 89-93.

See Supplementary abstract

1167
1925. Melander, A. L.

Making oil sprays.

Washington State Coll. Ext. Bul. 129, 10 pp.

See abstract of this Bul. in Wash. Station, Bul. 184, by Melander, Spuler & Green. This paper is a summary.

1168
1924 - Melander, A. L., Spuler, A & Green, E.L.
Oil sprays; their preparation and use for insect control.

Wash. Agr. Exp. Sta. Gen. Bul. 184, 31 pp.

See Supplementary abstract

1169
1915 - Melander, A. L. & Yothers, M.A.
Div. of Ent. & Zoology
Wash. Agr. Expt Sta. 25 Ann. Rept. Bul. 127; pp 30-38

The standard oil emulsion completely killed all scales at the end of 3 weeks.

1170
1917 - Melander, A.L. & Yothers, M.A.
Division of Ent. & Zoology.
Wash. Agr. Expt. Sta. 26th Ann. Rept. Bul. 136, pp. 35-42.

Dormant soluble oil, kerosene & gasoline had no effect on grubs of the strawberry root weevil.

1171
1917 - Melander, A.L. & Yothers, M.A.

The Coulee Cricket.
Wash. State Coll. Agric. Expt. Sta. Bul. 137, pp. 1-34

A 5 to 10% kerosene emulsion may be used to destroy the cricket in the first instar, but it has little effect afterwards.

1172
1923. Mendiola, N. B. and Capinpin, J. M.

Breeding ornamental hibiscus.

Philippine Agriculturist Vol. XI, No. 7, pp. 217-230.

Phenacoccus hirsutus, a coccid, can be controlled with kerosene emulsion spray, made as follows: 7.5 liters kerosene, 1/4 kilogram hard soap and 4 liters water.

1173

[illegible]

See Supplementary abstract

1174
1915 - Merrill, [illegible]

The Grape leaf-hopper.

New Mexico Agr. Expt. Sta. Bul. 94, 33 pp.

Control may be possible by spraying the spring brood of nymphs with kerosene emulsion diluted 1-10.

1175
1912. Merrill, G. E.

The white fly work at Marysville.

Mon.Bul.Cal.Hort.Soc.Vol.1,No.1,p.62.

The spray used was made up of a mixture of distillate 5% and water 95% to each 100 gals. to which 6 lbs. of caustic soda had been added. This spray was to defoliate the trees owing to the trees being in a dormant condition, No defoliation was affected.

1176

[illegible]

1177
1911. Metcalf, Z. P.

Spraying for the Euonymus scale.

Jour.Econ.Ent.Vol.IV,No.2,p.259-61.

Scalecide 1 - 10 in winter and 1-25 in summer was the most effective remedy. Kerosene emulsion at 60% in winter and 30% in summer was slightly below Scalecide in effectiveness. No injury to the plants resulted from their use.

1178
1911 Metcalf, Z.P.

Test Spraying for the Gloomy scale (*Chrysomphalus tenebricosus* [illegible]

Jour. Econ. Ent., 4, No. 6 [illegible]

S ee Supplementary abstract

1179
1917. Metcalf, Z. P.

Lime as an insecticide.

Jour.Econ.Ent.Vol.10,No.1,pp.74-81.

Kerosene was mixed with peas at the rate of 1/2 and 1 pt. per bushel. Only 21.5% of the peas germinated in the spring.

1180
1918, - Metcalf, Z. P.

Report of Entomologist.

41st Ann. Rept. N. Carolina Agric. Expt. Sta., year ended 30 June 1918, pp. 45-49

Soluble oils were effective against the gloomy scale whereas other solutions as lime sulphur were not nearly as effective.

1181
1923. Metcalf, Z.P.

The green June beetle as a tobacco pest.

Jour.Econ.Ent.Vol.16,No.4,p.396.

If the tobacco beds are to be placed in the same place year after year the soil should be sprayed with kerosene emulsion.

1182
[illegible]

[illegible] mosquito eradication.

U.S.P.H.Repts.Vol.XXXIV,No.5,31st January, 1919, pp.157-183.

Oiling is the main reliance in mosquito control next to draining. Straight kerosene is very effective, for it spreads rapidly and will make a very [illegible]. [illegible] mixed with some crude oil [illegible] upon circumstances and upon [illegible].

1183
1922. Miles, H. W.

The apple blossom weevil.

Jl.Minist. Agric.,London,Vol.XXIX,No.7,pp. 637-642;

The best results from spraying were obtained by an unstable paraffin emulsinn made by using potash soft soap 5%, paraffin 10%. This instability increases the effectiveness due to the release of the oil.

1184
[illegible] - Miller, D

The pear leaf curling midge.
Notes on the Auckland infestation.
New Zealand Jl. Agric., Vol. XXIII, No. 2, pp 84-92.

[illegible] undiluted was effective [illegible] single midge emerged. The [illegible] its use undiluted on [illegible], either dilute or [illegible].

1185
1916. Milliken, F. B.

The false chinch bug and measures for controlling it.

U.S.D.A.Farmers' Bul.762,4 pp.

A shield covered with petroleum and kerosene is used to catch the bugs as they are knocked from the plants.

1186
1913. Misra, C. S.

The red spider on jute.

Agr.Jour.India,Vol.8,No.4,pp.309-316.

The following formula is very effective when sprayed on jute plants infested with red mites:

Crude oil emulsion -----	1/2 pint
Flowers of sulphur -----	2 ozs.
Water ----------------	4 gals.

1187
1917. Misra, C. S.

The Indian sugar-cane leaf-hopper, *Pyrilla aberrans* Kirby.

Memoirs Dept.Agric.in India, Agric.Res.Institute, Pusa,Vol.V,No.2,Entom. Ser., pp.73-133.

A strength of 3 pints of crude oil emulsion to 4 gals. of water was found effective in keeping the leaf-hopper egg masses from hatching.

1188
1910. Mitzmain, M. B.

Notes on agents used for flea destruction.

U.S. Public Health Repts. Vol.25,No.30,pp. 1039-1045.

Kerosene and miscible oil are extremely efficient as flea destroyers.

1189
1894. Moffat, J. A.

Mosquitoes.

Ontario Ent.Soc.Rpt.1893, pp.43-48.

Stagnant water should be treated with kerosene.

1190
1912. Moore, W.

The tick problem in South Africa.

Jour.Econ.Ent.Vol.V,No.5,pp.377-384.

The following formulas are given for use as dips: (1) Pitchford dip: 5-1/2 lbs.soft soap, 2 gals.kerosene, 8-1/2 lbs.sodium arsenite, 400 gals. water; (2) 3 lbs.soft soap, 1 gal kerosene, 4 lbs sodium arsenite, 400 gals.water. Dipping should be done every week.

1191
1918. Moore, William

Observations on the Mode of Action of Contact Insecticides.

Jour. Econ. Ent. vol. 11, no. 6, [illegible]-6.

See Supplementary abstract

1192
1918. Moore, W. & Graham, S.A.

Toxicity of volatile organic compounds to insect eggs.

Jl. Agric. Research, Vol.12,No.9, pp.579-587.

Kerosene containing both low and high boiling points is destructive to both young and old, but is only slightly toxic to partially developed eggs.

1193
1918. Moore, W. and Graham, S.A.

A Study of the toxicity of Kerosene.

Jour, Econ, Ent., vol. 11, no. 1, ~~1918~~, pp. 70-75.

See Supplementary abstract

1194
1890. Morgan, H. A.

Texas screw-worm.

Louisiana Agr.Expt.Sta.Bul.2 (2d Series),pp.26-40.

Kerosene causes the maggots to let go, but its action is also irritant to the raw surface of a wound.

1195
1893 - Morgan, H. A.

Insects Beneficial and Injurious to the Orange and Other Citrus fruits.

Louisiana State Expt. Sta. Special Bul. pp. 51-111.

Formula for making kerosene emulsion: 2 gals. of oil, common soap, or whale oil soap 1/2 lb., water 1 gal. Dilute 1-9. This emulsion was not strong enuf hence one prepared as follows was found effective: In 3 gals. water boil 6 lbs. common soap and when dissolved add 3 gals. of kerosene, thoroly churn and add 20 gals. of water. The emulsion was found more effective upon scales on the leaves and smaller branches than those infesting the trunk. Weaker dilutions were (over) destructive to young and unarmored scales, but upon those well protected by developed scale they had little effect.

1196
1893 - Morgan, H. A.

Report of the Entomologist of the Louisiana Station. Louisiana State Expt. Sta. Bul. 22, pp. 731-736, 2nd ser.

For the corn root worm soak seeds of corn and melons in kerosene emulsion (undiluted) for 24 hrs. This hastens germination and wards off attack. Kerosene emulsion and an emulsion using common black machine oil for the kerosene was tried for the horn fly. These emulsions were not entirely satisfactory. Fish oil emulsion was better.

1197
1893. Morgan, H. A.

Scale insects of the orange.

La.Agr.Expt.Sta.Spec.Bul.pp.51-103.

The R & H formula is given. Dilute 1-9. This emulsion was found more effective upon scales that ~~infs~~ infest the leaves and smaller branches, than upon scales infesting the trunk.

1198
1896. Morgan, H. A.

A simple device for the preparation of oil emulsions.

U.S.D.A.Div.of Ent.Bul.6 (n.s.)pp.93-94.

A simple churn is recommended for use in making kerosene emulsion where a force pump may not be available. The main portion ofthe churn consists of a tin cylinder 20 to 24 inches long and 4 inches in diameter. Within an inch of the bottom of the cylinder is a row of seven small openings. The plunger consists OF A TIN CONE ATTACHED TO A three-eights-inch iron rod, at the other end of which is attached a handle, which may project any distance above the top of the cylinder. The cone has a base of such diameter as will fit nicely into the cylinder. About 3/4 of an inch above the base is a row of five openings the same size as those in the base of the cylinder. The churn may be used with or without a lid.

1199
1901 - Morgan, H. A.

The differential grasshopper in the Mississippi delta - other common species.

USDA Div. of Ent. Bul. 30 n.s., pp. 7-33.

A 12% kerosene emulsion sparyed on the nymphs was very effective.

1200
1903 - Morrill, A. W.

The Greenhouse Aleurodes and the Strawberry Aleurodes.

Mass. Agr.Coll.Hatch Expt. Sta. Tech. Bul. 1, 66 pp

Kerosene emulsion was made using ½ lb. soap, 1 gal. water and 2 gals. kerosene. Dilute 1-9 for soft bodied insects. This is a cheap spray troublesome to prepard, effective as an insecticide but requires syringing the leaves afterwards to prevent injury. Permol kerosene soap is too expensive, but is effective at the rate of 2 oz. to a gallon of water.

1201
1907. Morrill, A. W.

The Mexican conchuela in Western Texas in 1905.

U.S.D.A.Bur.Ent.Bul.64,pt.1,pp.1-14.

A small border may be left around the alfalfa field where the insects can be destroyed by spraying wihh kerosene emulsion.

1202
1910. Morrill, A. W.

Plant-bugs injurious to cotton bolls.
U.S.D.A.Bur.Ent.Bull.86,110 pp.
An uncut border a few feet wide around an infested alfalfa field will serve to trap the crawling insects which may then be destroyed by spraying with a strong solution of kerosene emulsion.

1203
1919. Morrill, A.W.

Report of the Entomologist.

10th Ann.Rept.Arizona Commiss.Agric. & Hortic. 1917-18, pp. 29-73.

Soaking milo maize seed in coal oil for at least 1/2 hr. was successful in protecting it from attack by ants.

1204
1914 - Morris, H.E., & Parker, J.R.

Fungicides and insecticides for Montana.

Montana Agr. Coll. Expt . Sta. Cir.36, p. 246-250.

One-half pound of ordinary bar soap is dissolved in 1 gal. boiling water. This is poured into 2 gals.of kerosene and vigorously churned for 10 minutes with a force pump. For use upon trees in foliage dilute with 10-15 parts of water. It is difficult to obtain soft water in some localities, and as a result, poor emulsions are made which cause injury. Miscible oils are mineral oils so treated that they readily mix with water. Arlington oil and scalecide are commercial brands of miscible oils. Miscible oils are not recommended in Montana.

1205
[illegible] - [illegible], [illegible] F.

Methods of destroying chinch bugs

Oklahoma Agr. Exp. Sta. Bul. 13, [illegible] pp.

Kerosene emulsion and kerosene are recommended as aids or in special cases as a means for the destruction of chinch bugs.

1206
1917 - Mote, D.C.

Some external parasites of poultry.

Ohio Agric. Expt. Sta. Bul. no. 320; pp. 137-156.

The body lice of chickens may be controlled with a dust made of 3 parts gasoline and 1 part crude carbolic acid in plaster of Paris. Mix thoroly and allow to dry for a few hrs. Mites of poultry can be controlled by spraying poultry house with 3 parts kerosene and 1 part of either crude carbolic acid or commercial cresol. Kerosene emulsion is also very effective.

1207
1926. Mote, D. C.

Insect pests of truck and garden crops.

Oregon Agric.Coll.Expt.Sta.Circ.65,40 pp.

The R & H kerosene formula is given. Kerosene nicotine oleate formula is as follows. Solution 1. Kerosene 1 gal. oleic acid 1 pt. The oleic acid is poured into the kerosene, stirring constantly. Solution 2. Volatile nicotine (40%) 2 pts., water 1 gal., The nicotine is added to the water. Solution 1 is poured into Sol. 2, and brought to a creamy consistency by churning. For use against soil insects use 1 pt. of the stock to 10 to 12 gallons of water.

1208
1909 - Moulton, D.

Papers on deciduous fruit insects and insecticides. The pear thrips and its control.

USDA Bur. of Ent. Bul. 80; pt. 4, pp. 51-66.

A distillate oil emulsion is made by dissolving 30 lbs. of whale oil or fish oil soap in 12 gals. of boiling water and removed to a spray tank to which 20 gals. of distillate oil (28°Be) are added. The mixture is agitated violently and sprayed into other containers. It is then diluted to 2% oil when ready to use. The diluted spray can be applied safely to opening buds, but trees should not be in full bloom.

1209
1911 - Moulton, D.

Papers on deciduous fruit insects and insecticides - California peach borer.

USDA Bur. Ent. Bul. 97; Pt. 4; pp. 65-89.

Crude oil was found to be an effective barrier to keep newly hatched peach borers from entering the trees. It also penetrates and draws many more mature worms out to their death. Peach trees showed no injury from the oil. Lime-oil combination appeared to be equally as safe though not quite as effective.

1210
1920. Moznette, G. F.

The Dictyospermum scale on the Avocado and how it may be controlled.

Qtrly.Bull.State Plant Bd.Florida, Vol.V, No.1, pp.5-11.

Oil emulsion used at a strength of 1-70 on the avocado during the dormant season has proved satisfactory. Two applications will usually rid the trees of this scale.

1211
1921. Moznette, G. F.

Some insect problems confronting the Avocado grower.

Jour.Econ.Ent.Vol.14, No.4, pp.341-344.

The white fly is controlled by spraying with the regular oil emulsion sprays. Two sprays are necessary, one during the spring at a dilution of 1-80, and another in the fall at 1-70.

1212
1921. Moznette, G.F.

Control of two scale insects of the mango.

Jour. Econ. Ent., vol. 14, no. 6, pp. 469-472

See Supplementary abstract

1213
1922. Moznette, G. F.

Insects injurious to the mango in Florida and how to combat them.

U.S.D.A.Farmers' Bul. 1257, 22 pp.

Oil emulsions have been satisfactory for controlling the mango shield scale and the tesselated scale, the Florida red scale, the Mango scale and Florida wax scale.

1214
1825. Murray, ________.

Notice regarding the hyacinth and tulip; and method of destroying earthworms.

Mem. Royal Caldeonian Hort.Soc.Vol.III, pp. 176-177.

A drop of oil is let fall into each worm hole and water then poured in, when the worm or insect comes to the top.

1215
1896 - Munson, W. M.

Notes on Spraying.

Maine Agr. Expt. Sta. Bul. 29, 4 pp.

Aphis and scale insects are best controlled with kerosene emulsion made as follows: Dissolve ½ lb. hard soap in 1 gal. water, add 2 gals. of kerosene and churn thru a pump for 5 to 10 minutes. Dilute 1-10, in general before using. On tender succulent plants dilute 1-15 or 1-20 and for scale insects on woody plants dilute 1-5.

1216
1899 - Munson, W. M.

The spraying of Plants.

Maine Agr. Expt. Sta. Bul. 52, 8 pp.

Kerosene is the specific for all sucking insects. It kills by contact and owing to its chepness and efficiency will remain a valuable insecticide. It is applied as a soap emulsion, 1/2 lb. soap, 1 gal. water and 2 gals. kerosene are emulsified. Dilute 10 to 20 times with water.

1217
1890 - Neal, Jas. C.

Entomological Notes.

Florida Expt. Agr. Sta. Bul. 9, - 16 pp.

(1) Kerosene emulsion: 4 lbs. soap dissolved in 1 gal. boiling water, to which 2 gals. of kerosene are added. Churn until oil is emulsified. (2) Also Cook's formula is given. To the first formula add 2 ozs. of balsam of fir. This makes the emulsion adhere to the surface of the leaves better.

1218
1918. Newcomer, E. J.

Some stone flies injurious to vegetation.

Jl.Agric.Research, Vol.13, No.1, pp.37-41.

Plum trees which had been sprayed with crude oil emulsion and nicotine sulphate for aphids were not as badly injured as those not sprayed.

1219
1923. Newcomer, E. J.

A new oil spray for the San Jose scale.

Proc.18th Ann.Meeting Washington State Hortic. Assoc., 1922, pp.83-87.

The government formula for making lubricating oil emulsion is given.

1220
1924 Newcomer, E.J.

Summer oil sprays. Proc. Wash. State Hort. Assn. 19 1924, pp. 93-7.

See Supplementary abstract

1221
1899 - Newell, Wilmon.

Some Injurious Scale Insects.
Iowa Agr.Col. Expt.Bul. 43, pp. 145-176.

Kerosene emulsion is prepared by dissolving ½ lb. soap (ivory or whale oil) in 1 gal. water added to 2 gals. of kerosene. The entire mass is emulsified by a force pump. Kerosene and milk emulsion is given according to Marlatt's formula. Farmers' Bul. 19. For spraying the scale insects on deciduous trees, apply in May and June at the time of egg hatching. At this time the emulsions should be diluted at the rate of one part to 10, 11, 12, 13, or 14 of water. The 1-14 will be efficient for most species. If used stronger than 1-11 while trees are in leaf or bloom it may cause injury. This same emulsion diluted 1-8 or 9 may be used in late autumn or early winter to kill insects and eggs beneath the scales.

1222
1903 - Newell Wilmon.

The Treatment of Orchards Infested with San Jose Scale.
Georgia State Bd. Ent. Bul. 8, 20 pp.

Statements concerning the use of oils in the treatment of San Jose scaleare taken from Bul. 4 & 5.

1223
1909. Newell, W.

Measures suggested against the Argentine ant as a household pest.

Jr. Econ.Ent.Vol.II,No.4, pp.324-332.

Crude petroleum was valuable for the destruction of exposed colonies. Kerosene may be used in the same way but is more expensive.

1224
1917. Newell, Wilmon.

Rept.of plant commissioner Dept.of Entomology.

Qtrly.Bull.Florida State Plant Bd.Vol.1,No.3, pp.59-123.

A treatment for camphor thrips consists of a 2% oil emulsion applied to the infested trees after they were severely cut back.

1225
1913. Newell, W. & Barber, T. C.

The Argentine Ant.

U.S.D.A.Bur.Ent.Bul.122.

Kerosene acts as a repellent until the odor has largely disappeared, but a film of kerosene on water only affords a good floor for the ants to travel on. Crude petroleum proved to be the most effective repellent.

1920 - Newman, L. J.
1226

Potato insect pests.
Western Australia Dept. Agr. Bull. 72, p. 7-27

The R & H formula is given for use on the green potato aphis at a dilution 1-6, 3-10

1923 - Newman, L. J.
1227

Red legged velvet earth mite
Western Australia Dept. Agric. Bul. 106, 4 pp

The R & H kerosene emulsion formula is given with 1,2 ounce naphthalene added.

1228
1900. Newstead, R.

The injurious scale insects and mealy bugs of the British Isles.

Jour.Roy.Hort.Soc. (London), Vol.23,No.3,pp. 219-262.

The R & H kerosene emulsion formula is given.

1908 - Newstead, R.
1229

The brown scale of the gooseberry and currant. Jour. Bd. Agr. (London) Vol. 15, No. 3, pp 195-19?.

[illegible] is [illegible]. The following formula is given. Caustic soda, [illegible] soft soap 1/2 lb; paraffin 5 pts; water 10 gals. The soap is dissolved in 1 gal of water and the paraffin added to the soap solution and emulsified The caustic soda is dissolved in the remainder of the water and this added to the emulsion. Mix well before using.

[illegible] - [illegible], H.M.
1230
Fungicides and insecticides:
Tasmania Agri. & Stock Dept. Bul. [illegible],
19 pp.

The R & H formula for kerosene emulsion is given. [illegible] red oil formula is given, 1 lb of soap is dissolved in 1[illegible] gal. of water [illegible] 1 [illegible] of oil [illegible] the entire [illegible] emulsion is used for dormant trees.

1914 - Nicholls, H.M.
1231
Scale insects
Tasmania Dept. Agric. & Stock, Bull. 78,
12 pp.

Scales may be kept in check on deciduous trees by the use of oil sprays, as red oil, [illegible] or kerosene emulsion.

1919 - Nicholls, H.M.
1232
The Woolly Aphis
Tasmania Agric. & Stock Dept. Bul. 83,
8 pp.

The sprays of red oil or crude petroleum have given doubtful results under the moist conditions that prevail in Tasmania. These sprays can only [illegible] during the dormant season.

19[illegible] - Nicholls, H.M.
1233
Annual [illegible] Government
Microbiologist,
Tasmania Dept. of Agric. & Stock
Rept. [illegible]
Oil [illegible] Tasmanian conditions [illegible]. [illegible] to be a [illegible] the [illegible].

1923 - Nicholls, H. M.
1234
Report of the Government Microbiologist.
Tasmania Agric. & Stock Dept., Rept. 1922-23, pp. 15-17

Oil spray may be used to destroy the overwintering eggs of aphis on cherry trees.

1235
1910. Nicholson, L. W.

Experiments with red oil.

Agric.Gaz.of N.S.W.Vol.21,No.3,p.240.

An application of red oil as a winter spray for woolly aphis was made to a number of apple trees. The spray was composed of 4 gals.red oil, 4 lbs. soft soap, 192 gals.water. No injury to the trees resulted.

1236
1892 - Niswander, F.J.
Insecticides.
Wyoming Agr.Exp.Sta.Bul. 7, pp. 201-208.

Prof. Cook's formula and the R & H formula are given. The Cook formula is given the preference, because it does not separate upon long standing. Plant lice, ticks, bugs and all sucking insects are readily destroyed by kerosene emulsion

1237
1907 - Norton, J. B. S., & Symons, T.B.
Control of Insect Pests and Diseases of Maryland Crops
Md. Agr. Expt. Sta. Bul. 115, pp. 145-210.

Formula for making kerosene emulsion is given. 2 gals of kerosene, 1 gal. of water; 1/2 lb. of soap.

1238
1916. Nougaret, R.L. Davidson, W.M. & Newcomer, E.J.

The pear leaf-worm.

U.S.D.A.Bul.438,23 pp.

A contact spray such as distillate oil emulsion applied with great force is recommended. Formula given in U.S.D.A.Bur.Ent.Circ.131.

1239
1909. Nullie, C. E.

Kerosene emulsion for terrapin scale.

Jour.Econ.Ent.Vol.II,No.2,pp.192-193.

20% kerosene emulsion killed very few leaves on soft maple and all the scales were killed.

1240

Nugent, T.C. An inhibition period in the separation of an emulsion. Trans. Faraday Soc., Oct. 27, 1921. Adv. copy. Chem. Abs., vol. 16, Mar. 10, 1922, p. 669. Study of an emulsion of benzene in water stabilized by gelatin, de-emulsified by a NaOH solution

1241
1922. O'Bryne, F. M.

Bordeaux-oil emulsion. Its preparation and Use.

Qtrly.Bull.State.Plant.Bd.Florida,Vol.VI,No.2, pp.46-58.

After the Bordeaux mixture has been made add very slowly 3 quts. of oil emulsion and the solution thenbecomes Bordeaux oil emulsion. This combination is intended primarily for use as a fungicide, although it has some insecticidal value also. The Government oil emulsion formula for deep well water is given as follows 2 gals. paraffin oil; 1 gal. water; 2 lbs. caustic potash fish oil soap; 1 bl. ground glue; 2 to 4 ozs. 50% carbolic acid.

1917 Odgers, J. J.
1242

Peach aphis

Jl. Dept. Agri. South Australia, Vol. XX,No.12. pp, 1013-14

The R & H formula is given

1243
1923. Ogilvie, L.

Notes on plant diseases and pests.

Agric.Bull.Bermuda Dept.Agric.Vol.II, No. 12,pp.7-8.

An oil-soap spray is used for the purple scale on citrus.

1244
1924. Ogilvie, L.

Notes on plant diseases and pests.

Agric.Bull.Bermuda Dept.Agric.Vol.III,No.1, pp.6-7.

Citrus scale may be cleaned up by an application of lubricating oil soap spray.

1245
1924. Ogilvie, L.

Notes on the control of plant diseases and pests.

Agric. Bull. Bermuda Dept.Agric. Vol.III, No. 3, pp.6-7.

Miscible oil should be used against the purple scale.

1246
1914. O'Kane, W. C.

The apple maggot.

N. H. Agr.Expt.Sta.Bul.171, 120 pp.

When kerosene emulsion is used at the rate of 1/2 gal. stock to a sq.yd.it requires a heavy dose of oil and a large quantity of water for the treatment of the ground beneath a tree. Only a few adults emerge when the kerosene treatment has been used.

1247
1921 - O'Kane, W.C. & Weigel, C.A.

Experiments with contact sprays for leaf miners.

New Hampshire Agricultural Expt. Sta. Tech. Bul. 17, 24 pp.

Kerosene emulsion was used in the experiments with leaf miners at strengths of 1-8, 1-12, and 1-15 with only fair results when sprayed on young larvae of the second generation. Kerosene emulsion (1-8) had the highest efficiency of any insecticide used for treatments from 7 day records, On mature larvae, (first generation), dilutions of 1-12 and 1-15 did not show any efficiency. On young larvae (second generation) for treatments from 7 day records, Kerosene emulsion (1-8) had an efficiency of 37%, 1-15, 6% and 1-12, 5%. From summary of concentrated insecticides on leaf miners on quinces, pure kerosene ranked 2nd; pure gasoline, 3rd; kerosene emulsion 1-5, 6th; kerosene emulsion, conc. 9th; gasoline and soap solution, 10th. Kerosene emulsion on the egg stage (1-8 dilution), gave 7.5% mortality. 1-12 & 1-15, gave no mortality. The effect of the first spraying on the eggs of the following generation: Kerosene emulsion (1-8) gave 12.8% mortality; 1-12 gave 19.2% and 1-15 gave 17% ~~matxx~~ mortality.

1248
1892 - Orcutt, I.H., & Aldrich, J.M.

Entomological Notes.

S. Dakota Agr. Expt Sta. Bul. 30; 20 pp.

The Cook formula is used for making kerosene emulsion for lice on stock. A 5% emulsion being applied with a sponge caused instant death to the lice. A 5% kerosene emulsion is excellent for cleaning an old hen house of its vermin. A 7% kerosene emulsion was used as a dip for sheep scab with excellent results. No injury to the sheep or fleece was noted.

1249
1900 - Ormerod, E. A.

Report of injurious insects and common farm pests during the year 1899, with methods of prevention and remedy.

Simpkin, Marshal, Hamilton, Kent & Co.,

90

Paraffin emulsion had no effect on the pear

1250
1917. Orton, W.A. & Chittenden, F.H.

Control of diseases and insect enemies of the home vegetable garden.

U.S.D.A. Farmers' Bul. 856, 70 pp.

The R & H kerosene emulsion formula is given.

1251
1884. Osborn, H.

Insecticides & their application.
Iowa Agr.Coll.Bull.2, pp.105-7.

Kerosene is a popular remedy for sucking insects. Injury to the plants was remedied by using it as an emulsion with milk. Two parts kerosene and 1 part milk are emulsified by churning vigorously. This emulsion is then diluted 12 to 16 times when ready to use.

1252
1891. Osborn, Herbert.

An experiment with kerosene emulsion.
Insect Life, Vol.4, Nos.1 & 2, p.63-4.

The Cook formula for making kerosene emulsion was followed carefully when the material was placed in a glass jar. A separation could be seen taking place and the ingredients would not readily mix after a few days. Another preparation was made by the R & H formula. This remained emulsified and did not separate out. The first was not an emulsion. The latter was preferable to the first preparation.

1253
1893. Osborn, H.

Methods of attacking parasites of domestic animals.

Insect Life, Vol.VI, No.2, pp.163-165.

Kerosene emulsion has been used with success on cattle and hogs and for sheep dips.

1254
1896 - Osborn, Herbert.

Insects affecting domestic animals.
USDA Div. of Ent. Bul. 5 (N.S) 302. pp.

Kerosene pure, or as an emulsion made by the R & H formula or with milk, benzine and gasoline are effective ~~xx~~ under certain conditions against insects affecting domestic animals.

1255
1896 - Osborn, H.

Notes on Injurious Insects.
Iowa Agr.Coll. Ext. Sta. Bul. 33, pp. 594-605.

Spray the insides of chicken houses with kerosene or kerosene emulsion for chicken mites.

1256
1891 - Osborn, Herbert & Gossard, H.A.
Reports of Entomological Work.
Iowa Agric. Expt. Sta. Bul. 14, pp. 166-180.
Three plum trees infested with plant lice were sprayed with kerosene emulsion made by the standard formula. Some branches were dipped. All the lice were killed on the dipped branches. Nearly all were killed on the sprayed trees. Some injury resulted from the dipping due to the action of the free kerosene. This should be skimmed off. No damage resulted to the foliage from the application with the pump. Failure with this remedy may be due to poor emulsions, lack of thoro application and, in cases where the leaves have become curled, by the fact that so many lice are protected by the leaves that the liquid does not reach them.

1257
1893 - ~~Osborn, Herbert, & Pammel, L.H.~~
Machinery and Methods for Spraying.
Iowa Agr.Coll.Expt.Sta.Bul. 20, pp. 706-712.
Kerosene emulsion is prepared by dissolving ½ lb. hard soap in 1 gal. water. While still hot add 2 gals of kerosene and force the mixture thru a pump for 5 or 10 minutes. In diluting use from 9-15 times as much water, as emulsion. The former proportion is advised for scale insects and harder bodied insects such as chinch bugs; the latter for plant lice and other soft bodied delicate or exposed insects. It kills only the insects touched by it.

1258
1894 - Osborn, Herbert, & ~~Sirrine~~ Sirrine, F.A.
Notes on Injurious Insects.
Iowa Agr.Coll.Expt.Sta.Bul. No.23, pp.881-905.
Aphids can be kept in check by persistent spraying with weak solutions of kerosene emulsion (about fifteen parts water to one part of Riley Hubbard Emulsion). It seems best in making the emulsion to use a little excess of soap thus avoiding any free kerosene which may result from poor quality of soap or lack of machinery to make a perfect emulsion.

1259
Pacheux, M.
1926. Recherches sur la constante dielectriquedes petroles et faraffines.
Compt. rend. Acad. Sci. Paris, Vol. 183, No. 13, pp. 530-532.

See Supplementary abstract

1260
1915. Paddock, F. B.
The Turnip Louse
Texas Agr. Exp. Sta. Bul. 180, 77 pp.
The R & H formula is given and was not satisfactory for use on turnips, a proprietary stock diluted to 5% was very effective and no burning of the leaves occured.

1261
1897 - Paddock, Wendall.
Spray pumps and Spraying; N. Y. Agric Expt, Sta. Bul. 121; pp. 197-219.
Kerosene emulsion is made by dissolving ½ lb. common or whale oil soap in 1 gal. boiling water and adding to it 2 gals. of kerosene. This mixture is emulsified by churning with a force pump until creamy. For a foliage spray dilute with 10 to 15 parts water; for winter treatment dilute 1-4.

1262
1892. Panton, J. H.
Fungicides and insecticides.
Ontario Agr.Coll.Expt.Sta.Bull.73,6 pp.
The R & H & Cook's formulas are given for kerosene emulsion. These emulsions are excellent for plant lice, scale insects, chinch bugs, cabbage worms and even rose beetles.

1263
1893. Panton, J. H.
Remedies for common plant and insect foes.
Ontario Agr. Coll.Expt.Sta.,Bull.87, 8 pp.
The R & H and Cook formulas for kerosene emulsion are given.

1264
1897. Panton, J. H.
Instructions in spraying.
Ontario Agr.College and Exp. Farm Bul.105, 15 pp.
The R & H formula for making kerosene emulsion is given.

1265
1898. Panton, J. H.
Report of the professor of biology and geology.
Ontario Agr.Col.& Expt.Farm Rpt.1897,pp.11-24.
The R & H formula is given. Dilute 1 - 9 to 15 for use on San José scale.

1266
1912 - Parker, J. R.
The pear-leaf blister mite.
Montana Agr. Coll. Expt. Sta. Circ.16, pp.115-118.
Formerly kerosene emulsion was recommended as the best treatment when applied inthe winter. This treatment did not prove satisfactory.

1267
1922. Parker, J. R.
Miscible oils and fruit-tree leaf-roller.
Better Fruit, Vol.XVI,No.9, p.7-8.
Dormoil (1-115) gave the best results in both winter & spring applications and caused almost no spray injury. Universal Brand Dormant Soluble Oil gave fair results, but some spray injury. Scalecide gave poor results and considerable spray injury. Spra-Mulsion gave very poor results.

1268
1921 - Parker, R. R.
Report of tick control operations in Bitter Root Valley during seasons of 1919-1920.
4th Bienn. Rept. Mont.State Bd. Ent. 1919-20, p.18-44
Many instances have been noticed in which kerosene and lard (applied for lice) have served to keep animals tick-free for long periods.
Crude petroleum had not yet been tried.

1269
1923. Parker, T.
Nicotine petroleum emulsion.
Bull.from Bur.Bio-Technology of Messrs.Murphy & Son, Ltd.,Vol.II,No.9,pp.27-31.
A colloidal solution of nicotine 2%, petroleum oil 50% (special specification) is known as nicotine petroleum emulsion or N.P.E. It has been found that a 1-16 dilution of N.P.E. can be used for controlling aphids, psylla, and capsid bugs if used in conjunction with 0.2% calcium arsenate. No damage has been reported from its use.

1270
1910. Parker, W. B.
The life history and control of the hop flea-beetle.
U.S.D.A.Bur.Ent.Bul.82,pp.33-58.
Kerosene emulsion ranks next to black leaf tobacco extract in effectiveness against this flea beetle.

1271
Parman, D. C. ;Bishopp, F.C. ;and Laake, E.W.
1927. Chemotropic tests with the Screw-worm fly.
U.S. Dept. Agr. Bul. No. 1472 32 p.
Petroleum,crude naphtha, and toluene plus petrolatum were used ~~XXXXXX~~ in chemotropic tests with the Screw-worm fly on blow meat and carcasses.

1272
1906. Parrott, P. J.
Notes on some insects and sprays.
N.Y. Fr.Grow.Assoc.1906,pp.22-7.
The K-L mixture is a mechanical emulsion of lime, kerosene and water. The results from its use were variable both as to injury and effect on scale. Soluble oils were tested at 3.5 and 7 % strengths for summer sprays. The trees were defoliated. Winter tests of 5.7, 10 and 15% oil were made. The effectiveness on scale varied directly with the amount of oil used.

1273
1906. Parrott, P. J.
The San Jose scale and how to control it.
N.Y.Fr.Grow.Assn.1906, pp.129-135.
Crude petroleum is a very efficient but dangerous spray. Kerosene emulsion may be used in summer at a dilution of 1-7. K-L mixture was tried at strength of 10, 15, 20, 30 and 40 % oil. Variable results in injury were obtained. Results of tests with soluble oils have proved very encouraging.

1274
1907. Parrott, P. J.

The pear blister-mite.

U.S.D.A.Bur.Ent.Bul.67,pp.43-46.

Crude and refined oil, either clear or emulsified have proved the most efficient sprays. Kerosene emulsion 1-5 is a practical remedy for the spraying of apple orchards.

1275
1908 - Parrott, P. J.

Remedies for the San Jose scale and directions for their use.

N.Y. State Agri. Expt. Sta. Circ. 9: pp. 388 - 397

S ee Supplementary abstract

1276
1908. Parrott, P. J.

Scale problems.

N. Y. Fr.Grow.Assn.1908,pp.146-149.

Home made miscible oils were made according to directions from Delaware Expt.St.Buls.75 & 79 and Conn.Expt.Sta.Bul.49. Five of these formulas were found to be fairly satisfactory.

1277
1908 - Parrott, P.J.

Control of Leaf Blister Mite in Apple Orchards.

N. Y. State Agr. Expt.Sta. Bul. 306, pp 417-438.

Miscible oil used at a dilution 1-9 and kerosene emulsion diluted to contain 15% oil are efficient blister mite remedies.

1278
1921. Parrott, P. J.

The season's experience with insects and insecticides.

Proc.66th Ann.Meeting N.Y.State Hortic.Soc., 1921,pp.17-37.

Miscible oil is recommended for pear thrips.

1279
1924. Parrott, P. J.

Some side lights on dusting and spraying practices.

Proc.69th Ann.Meeting N.Y.State Hortic.Soc., pp.118-134.

The government lubricating oil emulsion formula is given for use against San Jose scale.

1280
1915 - Parrott, P.J., & Fulton, B.B.

The Cherry & Hawthorn Sawfly Leaf-miner.

N. Y. State Agr. Expt. Sta. Bul. 411; pp. 551-580.

In experiments to check the mining of cherry leaves the larvae of the sawfly proved to be very resistant to kerosene emulsion, miscibleoil, gasoline and kerosene.

1281
1925. Parrott P.J. and Glasgow, Hugh.

The efficiency of various sprays and dust mixtures in controlling the rosy aphis. Jour. Econ. Ent. vol. 18, no. 1. pp 214-218.

See Supplementary abstract

1282
1912. Parrott, P.J. and Hodgkiss, H.E.

The susceptibility of adults and eggs of Pear Psylla to Spraying mixtures.

Jour. Econ. Ent. 5. No. 2. pp. 193-194.

Miscible oils and home-made emulsion were ~~found~~ effective against the insect.

1283
1915 - Parrott, P.J., & Hodgkiss, H.E.

The Status of Spraying Practices for the Control of Plant Lice in Apple Orchards.
N.Y.State Sta.Bul. 402, pp. 193-210.

The R. & H. formula for kerosene emulsion is given. This was used with success when diluted 1-8.

1284
1917 - Parrott, P.J. & Hodgkiss, H.E.

Periodical Cicada in 1916; N.Y. Agric. Expt. Sta, Circ. 50, pp. 474-477.

Emerging pupae are killed by sprays of homemade or commercial oil emulsions ~~xxxxxxits~~. Kerosene emulsion has some effect on adults but is of little practical value.

1285
1906 - Parrott, P.J., Hodgkiss, H.E., & Schoene, W.J.

The Apple and Pear Mites.
N.Y.State Agric. Expt.Sta. Bul. 283; pp.281-318.

Kerosene oil and crude petroleum, pure and emulsified, and miscible oil gave the most satisfactory results on pear and apple trees. The undiluted oils produced the greatest reduction in the number of mites of any of the sprays used. Unfortunately these oils may cause injuries to fruit and leaf buds. The kerosene emulsion diluted 1-8 appears to be the more practical remedy for the orchardist. Miscible oil gave very satisfactory results. It should be diluted with 15 to 20 parts water.

1286
1908 - Parrott, P.J., Hodgkiss, H.E., & Schoene, W.J.

Control of Scale in old apple orchards.
N.Y. State Agr. Expt. Sta. Bul. 296; 30 pp.

Results of spraying in 1905: Crude petroleum applied undiluted, killed a large percentage of fruit buds and many of the leaf buds, which destroyed the crop and retarded leafing for three weeks. As the season advanced, the foliage showed improvement and by August the sprayed trees appeared to be in nearly as good condition as the rest of the orchard. A very large percentage of the scales were destroyed. Kerosene-lime-mixture: This spray caused severe injury to one side of 15 trees which reduced the crop and destroyed much of the foliage The remainder of the trees gave a good yield of fruit and the foliage was normal. The effect on the scales was variable and little benefit resulted from the treatment.

Results in 1907: Home-made oil emulsion containing 20% oil gave better results on the scale than the sulphur wash, the block sprayed with miscible oil (10%) was the least satisfactory.

1287
1908. Parrott, P.J., Hodgkiss, H.E., and Schoene, W.J.

Dipping of nursery stock in the lime-sulphur wash.

N.Y.Geneva Agr.Expt.Sta.Bul.302,pp.173-202.

Kerosene emulsion containing 10,15 & 20% oil and miscible oil diluted 1-10, 1-15 and 1-20 were used as dips. No injury resulted from their use and the stock was cleared of scale.

1288
~~1906 - Parrott, P.J., Hodgkiss, H.E. & Sirrine, F.A.~~

Commercial Miscible Oils for Treatment of the San Jose Scale.
N.Y. State Agric. Expt.Sta. Bul. 281, pp. 261-270.

The bulletin contains the details of a number of experiments with commercial miscible oils (Scalecide, Kilo-scale and Sure-kill) to determine their merits for the control of the scale. Applications of proprietary miscible oils 1-20 or 1-25 failed to give uniform results. Trees receiving these treatments showed more or less spotting of fruit and varying infestation of new growth. The oils diluted 1-10 or 1-15 were not as effective x to the scale as the boiled lime sulphur. The stronger applications destroyed large percentages of scale, being sufficiently effective to maintain the thriftiness of the trees and to keep the fruit crop fairly clean.

1289
1921 Parsons, Leon W. and Wilson, O.G. Jr.

Some factors affecting the stability and inversion of oil-water emulsions. J. Ind. Eng. Chem. 13, p. 1116

1290
1912. Passy, P.

Les teignes du poirier.

Jour.d'Agric.Pratique.Vol.76,T.23,p.691-693.

The following preparation might be used for destroying the hibernating larvae in the covering and also the eggs: Water 100 liters, Na_2CO_3 1 kilog. fish oil. 2 kilog. crude oil, 9 kilog.

1291
1920. Patton, W. S.

Some notes on the arthropods of medical and veterinary importance in Mesopotamia, and on their relation to disease.

Ind.Jl.Med.Res.,Vol.VIII,No.2, pp.245-256.

Kerosene oil is recommended as a repellent for sand flies. It is also a good plan to spray dark ~~xxxxx~~ corners in bath and other rooms with kerosene emulsion.

1292
1924. P[illegible]nter, L.

The orchard.

New Zealand Jour. Agric. Vol. 28, No. 6, p. [illegible]

If San Jose scale is at all in evidence all stone fruit should be sprayed with red oil 1-15.

1293
1915. Pearl, R., Surface, F.M., & Curtis, M.R.

External parasites.

Diseases of Poultry, The Macmillan Co., N.Y., pp. 203-232.

A successful spray for mites is: 3 parts kerosene and 1 part crude carbolic acid. Kerosene emulsion made by the R & H formula may also be used.

1294
1903. Pearson, A. N.

White Ants in orchards, plantations and fields.

Agr. Jour. and Min. Rec. (Natal), Vol. 6, No. 21, pp. 777-8.

Kerosene is recommended for dipping the ends of cane shoots to keep the white ants from destroying the cane.

1295
1906 - Penny, C.L.

Petroleum Emulsions. Delaware Coll. Agr. Expt. Station Bul. 75, pp. 39.

See Supplementary abstract

1296
1907 - Penny, C. L.

Homemade miscible oils. Delaware, Coll. Agr. Expt. Sta. Bul. 79, pt. I. pp. 1-34.

Summary:- Heavier-bodied oils than kerosene, such as paraffin oil, are needed for winter spraying. Rosin oil is a most valuable aid in emulsifying heavy oils. The soap solution described in Bul. 75 has been found serviceable. Specific directions for making miscible oils alone are given in Formulas #29-#37. Combinations of miscible oils with copper are yet experimental, and are described here merely in respect to their physical and chemical properties, without commendations. Miscible oils may in proper proportion be mixed with standard Bordeaux. They may also be mixed with copper hydroxide and excess of caustic alkali. They may also be mixed with copper oleate, or copper soap. The mixture with Bordeaux is the cheapest. The mixture with copper hydroxide and excess of caustic alkali is easiest to make. The copper soap mixture especially requires further study as to its fungicidal value. The orchard tests of Part II do not relate to copper preparations. Orchard tests show kerosene emulsions of moderate strength to be too weak for efficient winter spraying. Orchard tests show several of the heavy oil emulsions here described to be effective insecticides for the San Jose scale at 10% strength. The miscible oil made according to formul No. 34 appears to be the most effective insecticide for the San Jose scale that we have produced. It is believed that emulsions of the oil will be found to be effective when considerably less than 10% oil is applied to the trees.

1297
1907 - Penny, C. L.

Some practical methods for making oil emulsions. Delaware Coll. Agr. Expt. Sta. Cir. 1, 6 pp.

The only materials here proposed other than those mentioned in Bul. 75 are paraffin oil and rosin oil. There appears to be no more difficulty in emulsifying crude oil and the heavier oils, than in emulsifying kerosene. Paraffin oil is a lubricating oil worth about 14½ cents a gallon.

1298
1908 - Penny, C.L.

Miscible Oils; How to make them.

Penns. State Coll. Agric. Expt. Sta. Bul. 86; 20 pp.

This bulletin is based on Bulletins 75 and 79 of the Delaware College Agric. Expt. Sta.

1299
1921. Penny, Donald, D.

The results of using certain oil sprays for the Control of the fruit tree leaf roller in the Pajaro Valley, California.

Jour. Econ. Ent., vol. 14, no. 5, pp. 428-437.

See Supplementary abstract

1300
1892. Perkins, G. H.

The White Grub.

5th Ann. Rept. Vermont Agr. Expt. Sta. for 1891 pp. 144-155.

Kerosene emulsion was very effective against the white grub.

1301
1892. Perkins, G. H.

Insecticides.

5th Ann. Rept. Vermont Agr. Expt. Sta. for 1891, pp. 155-159.

Both the R & H and Prof. Cook's formulas for kerosene emulsion are given.

1302
1894. Perkins, G. H.

Report of the entomologist.

Vermont Agr. Expt. Sta. Rpt. 1893, pp. 119-145.

Kerosene emulsion is valuable as a remedy against root infesting insects, or such as live under ground.

1303
1897. Perkins, G. H.

The red spider.

Vermont Agr. Expt. Sta. Rpt., 1896-97, pp. 75-86.

Kerosene emulsion was recommended as a good remedy for the red spider.

1304
1900. P[illegible] G. H.

The forest c terpillar.

Vermont Agr. Expt. Sta. Bul. 76, pp. 111-137.

The well grown caterpillars may be destroyed by spraying them with kerosene or kerosene emulsion. Care must be used not to get the pure oil on the trees.

1305
1924. Perry, W. M.

Insect [illegible] of melons and other cucurbits.

Virginia [illegible] Agr. Expt. Sta. Rpt. 1924, 11 pp.

[illegible] with kerosene [illegible]

1306
1902 - Peters, A.T.

Mange in cattle and horses and lice on hogs.

Nebraska Agr. Expt. Sta. Bul. 74, 30 pp.

Kerosene emulsion dip is made by dissolving ½ lb. hard or whale oil soap in 1 gal. of boiling water and add 2 gal. of kerosene. Agitate thoroly until cool. When ready to use dissolve in 20 times its volume of water. This is recommended for sheep scab.

1307
1917. Peterson, Alvah.

Studies on the morphology and susceptibility of the eggs of Aphis avenae. Fab., Aphis pomi Deg[illegible] and Aphis sorbi Kalt. Jour. Econ. Ent. vol 10, no. 6, pp. 556-560

Scalecide (1-15) killed 2[illegible]-65 o/o of eggs. Mechling's Scale Oil, 79-9[illegible] o/o. The difference is [illegible] to the phenol derivatives in the latter pre[illegible]

1308
1919. Peterson, A.

Response of the eggs of Aphis avenae, Fab., and Aphis pomi, DeG. to various sprays, particularly concentrated lime-sulfur and substitutes, Season 1918-1919.

[illegible] Jour. Econ. Ent., vol 1[illegible], no. 5. pp. 3[illegible] -

Scalecide (1-15; 1-40) not an efficient ovicide for eggs of Aphids. Greatest toxicity reached was [illegible]1 o/o at 1-15 concentration.

1309
1920 - Peterson, A.

Some Notes on the Spreading Quality of Various Contact Sprays.
N. J. Agric. Expt. Sta. Rpt. 1918-19. pp.428-433.

Scalecide, a miscible oil, has a better spreading quality than lime sulphur and its surface tension is considerable lower. Its spreading quality can be materially increased by adding soap. Yet this increase apparently, does not increase the efficiency of Scalecide in killing aphid eggs.

1310
1916. Petherbridge, F. R.

Spraying for apple sucker.

Ann.App.Biol.Vol.II,No.4,pp.231-234.

The following formula is given: Soft soap, 10 lbs.; kerosene 2 gals. , water 100 gals. This was very effective in killing the sucker.

1311
1917. Pettey, F. W.

The quince borer [illegible]

Union S. Africa D[illegible],Bull.[illegible]

[illegible] larvae, but it is not effective [illegible]. The trees treated [illegible].

1312
1898 - Pettit , Rufus, H.

Some insects of the year 1897.
Mich.State Agr.Coll. Expt.Sta. Bul.160, pp.399-437

Kerosene emulsion may be used against all lice, (except bark lice) bugs, etc., which do not succumb to the internal poisons. Place 2 gals. of kerosene in a warm location and allow to become as warm as possible. Boil 1 lb. of laundry soap or whale oil soap in 1 gal of water until completely dissolved. Add the kerosene and agitate for 10 minutes with a force pump. The mixture should be diluted 10 times for most insects, but many plants are able to resist a stronger mixture which is usually more effective.

1313
1899 - Pettit, Rufus, H.

Some insects of the ear 1898.

Mich. State Agr. Coll. Expt. Sta. Bul. 175.
Pettit,R.H.
Kerosene emulsion. Same as in Bul. 160 of this station.

1314
1900 - Pettit, Rufus, H.

Some insects of the year 1899.
Mich. Sta.Agr. Coll. Expt.Sta. Bul. 180;pp.117-141.
Pettit, R. H.
Kerosene emulsion same as in Bul. 160 of this station. Kerosene and water mixture is added as a substitute for kerosene emulsion, when a large amount of work is to be done in the winter time against scale insects. The kerosene used should be a quite high test oil. Application should not be made with more than 20% oil and then should not be used on peach.

1315
1902 - Pettit, Rufus H.

Some insects of the year 1901-
Mich.State Agr.Coll. Expt.Sta. Bul. 200, pp.179-212.

Kerosene emulsion is recommended for the control of apricot scale on plum, peach lecanuim, plant lice and the barred winged onion maggot.

1316
1902. Pettit, R. H.

Report of the consulting entomologist.

Mich.Agr.Expt.Sta.15 Ann.Rept.1902,pp.79-80.

Light fuel oil was used on ponds with success against the mosquito larvae.

1317
1904 - Pettit, Rufus, H.

Insects Injurious to Fruits.
Mich.State.Agr.Coll.Expt.Sta.Special Bul. 24, 79 pp.

Kerosene emulsion is made by placing 2 gals. of kerosene in a place to warm. Boil 1 lb. of laundry or whale oil soap in 1 gal. of soft water until dissolved. Then add the kerosene ~~for the kerosene~~ and agitate until emulsified. It is recommended for wooly aphis, the eccentric scale, apple tree plant lice, the ring-legged tree bug, the cherry tree plant louse, the four lined leaf-bug, cottony maple scale, San Jose scale, the English walnut scale, the peach lecanium, black peach aphis, pear psylla, pear leaf blister mite and plum aphids.

1318
1905 - Pettit, Rufus H.

Insects of the Garden.
Mich. State Agr. Coll. Expt. Sta. Bul. 233, 77 p.

Kerosene emulsion is made by placing 2 gals. kerosene in a warm place and allow to become as warm as possible. Boil 1 lb. of laundry or whale oil soap in 1 gal. of soft water until dissolved. Add the kerosene and agitate for 10 minutes with a spraying pump. Pyrethro-whale oil soap kerosene emulsion: To 1 gal. of the undiluted emulsion made with whale oil soap add 1 oz. pyrethrum. Stir well and dilute before using.

1319
1922 - Pettit, R. H.

Report of section of Entomology.
60th Ann. Rpt. Mich State Bd. Agr. 1920-21; pp.184-187.

Scalecide was used to kill the eggs of the fruit tree leaf roller, just before hatching. The spray was applied when the leaf buds burst and with pretty fair success, since the number of living worms was very much reduced over that of previous years.

1320
1925 Pettit, R.H.

Report of the Section of Entomology. Mich. Agric. Expt. Sta. Rpt. 1924, pp. 209-219

See Supplementary abstract

1321
1903 - Phillips, J. L.

4th Rept. of the State Entomologist and Plant Pathologist of Virginia.
Va. Agr.Expt.Sta.Spec. Bul. 1902-3.

Emulsions of refined and crude kerosene were used in tests on San Jose scale. The crude oil tested 45°Be. An emulsion made with refined kerosene and diluted with twice its bulk of water seemed a safe remedy for treating the trunks of trees, but injured the foliage slightly. Stronger emulsions are likely to injure the plants. The crude kerosene emulsions are more injurious to growing plants than emulsions made of refined kerosene.

1322
1908. Phillips, J. L.

Home-made soluble oils for use against San Jose scale.

South.Plant.69th Yr.No.12,p.1066.

Phillips, J.L.
See Va.Sta.Bul.179,for abstract.

1323 Phillips, J. L.
1908

Home-made soluble oils for use against the San Jose scale.

Va. Agric. Expt.Sta. Bul. 179; p. 77-88.

See Supplementary abstract

1324
1910 - Phillips, J.L.

Rept. on Insects & Insecticides.
7th Rept. State Ent. & Plant Path. Va. 1908-9.
pp. 7-56, 99-113.

Kerosene emulsion is recommended for scale insects. See Bul. 179 of Va. Agr.Expt Sta. for soluble oil emulsion formulas.

1325
1900 - Phillips, J.L., & Price, H.L.
The nature and use of certain insecticides

Va. Agr.Expt.Sta.Bul. 97, pp. 7-26.

Pure kerosene may be used, on plants infested with San Jose scale. A 20% kerosene and water mixture may also be used. The R & H formula for making kerosene emulsion is given. Whale oil soap is used.

1326
1921 - Phipps, C.R.

Control of the Pear Thrips.
N.Y.Agr.Expt. Sta. Bull. 484, 11 pp.

The best results were obtained by using 5 gals, of miscible oil and 1 pint of nicotine sulphate to 100 gals. of water. This should be applied as soon as the adults appear in numbers.

1327
1907 Pickering, Spencer Umfreville

Emulsions. J. Chem.Soc. 91. Part 2, 2001-11.

1328
1907. Pickett, B. S.

Standard spray mixtures.

Trans.Ill.Hort.Soc.for 1907,Vol.41,n.s. pp.375-390.

The R & H kerosene emulsion formula is given.

1329
1907 - Pierce, W. Dwight,
Notes on the economic importance of sowbugs.

USDA Bur. of Ent. Bul. 64, pt. 2, pp. 15-22.

Kerosene emulsion as a contact spray is fatal.

1330
1923. Pillai, N. K.

Entomology.

Report Dept.Agric. & Fisheries, Travancore (India), for 1920-21, Chapter 3, pp.19-22.

Kerosening the water was effective against the paddy insects.

1331
1893 - Piper, Chas. V.
Two injurious insects
Wash. Agr. Expt. Sta. Bul. 7. pp. 121-127.

The R & H formula and Prof Cook's kerosene emulsion formula are given for use on the cottony maple scale.

1332
1895 - Piper, Chas. V.
Insect pests of the garden, farm and orchard.
Wash. Agr. Expt.Sta. Bul. 17; 66 pp.

The R & H formula for kerosene emulsion is given. Ivory soap may be used in place of the whale oil soap. The sour milk formula for kerosene emulsion is also given.

1333
1902 Piper, C. V.
Orchard enemies in the Pacific Northwest.

U.S.D.A. Farmers' Bul. 153, 39 pp.

The R & H formula for making kerosene emulsion is given.

1334
1903 - Piper, C.V.
Spraying for the San Jose scale.
Wash. Agr.Expt.Sta.Bul. 56; pp. 1-27.

Summer spraying with kerosene and petroleum on peaches was very effective against the scale. No foliage injury resulted. The oil varied from 10 to 25% when sprayed. A mixture of kerosene and petroleum caused some injury.

1335
1898 Piper, C. V. & Doane, R.W.
Miscellaneous injurious insects

Wash. Agr. Exp. Sta. Bul. 35, 24 pp

Kerosene emulsion 1-4 gave satisfactory results on the San Jose scale

1336
1922 - Place, F. E.
Blowflies & sheep
Jl. Dept.Agr. S. Australia,
Vol. XXV, No. 8, pp 700-705

Kerosene may be used as a disinfectant for dead animals.

1337
1920 - Pomeroy, A.W.J.
The prophylaxis of malaria in Dar-es Salaam, East Africa. Jl. R.A.M.C., Vol. XXXV, No. 1, pp 44-63

A mixture of 1/2 crude oil and 1/2 kerosene was found best for use in oiling. The surface tension of the oil used is the most important point: too heavy a mixture of oil will cause congealed masses and a very thin and volatile film, resulting from the lighter constituents of the oil.

1338
1889. Popenoe, E. A.

Three insecticides of general value.

Trans.Kansas Hort.Soc.1888,p.299-302.

The Hubbard sour milk-kerosene emulsion formula is given.

1339
1906. Powne, C. H.

Report on remedial experiments for insects injurious to cabbage, cucumbers and related crops.

Va. Truck Exp. Sta. Bul. 2, pp 26-29

Kerosene emulsion was not entirely effective on the cabbage aphis. The R & H formula is given.

1340
1925. Porter, B. A.

Lubricating oil emulsions.

54th Ann.Rept.of the State of Mich.Hort.Soc.for 1924,pp.116-122.

The government formula for making the boiled fish-oil soap is given. This lubricating oil emulsion is used chiefly as a dormant spray for San Jose scale at a strength of 2 %. No injury has resulted from the use of a properly prepared emulsion. No cumulative injury from the use of oil has yet appeared.

1341
1897. Powell, G. H.

The strawberry root louse.

Garden & Forest,Vol.10,No.472,March 10,1897,pp. 93-94.

The strawberry root louse is easily treated on nursery stock with kerosene emulsion.

1342
1898--Powell, G. Harold.

Report of the Entomologist. Kerosene Experiments pp. 239-246. IN 10th Ann. Rept. Del. Coll. Agr. Expt. Sta. for 1898.

See Supplementary abstract

1343

Pratt, B. G.
1922. Nature and action of oil sprays.

Better Fruit Vol. 17, No. 5, pp. 10,11,19, 20.

See Supplementary abstract

1344
1917 - Prescott, E. E.
Orchard & garden notes
Jl. Dept. Agric. Victoria, Vol. XV, No. 2, pp 126-127

Young evergreen trees infested with scale should be sprayed with a weak red oil emulsion.

1345
1895 - Price, R. H.

INSECTICIDES.

Texas. Agr. Expt.Sta. Bul. 36, pp. 649-651.

For sucking insects kerosene emulsion made by the R & H formula is recommended. The sour milk formula is also given.

1346
1905. Price, T. M.

The preparation of emulsions of crude petroleum. U.S.Dept.Agr.Bur.Anim.Indus.Circ.89, 4 pp.

The ordinary kerosene emulsion is not well adapted for use as a dip or hand treatment for animals, since the oil does not remain emulsified and is distributed unevenly on the surface of the body.

Beaumont oil has been found by the Bureau to be an effective dip for destroying cattle ticks. There are certain objections to its use, however, particularly an occasional injury to cattle. Experiments were therefore made to secure an emulsion which would remain uniform for an indefinite period. This was accomplished by employing a formula calling for 2 gals. crude petroleum, 1/2 gal. water, and 1/2 lb. hard soap. The soap is dissolved in hot water and the crude petroleum is added and mixed with a spray pump, after which it is diluted with the desired amount of water.

An emulsion of crude petroleum made in this way remains fluid indefinitely without any tendency to a separation of oil and water. Brief directions are also given for the preparation of emulsions and other oils.

1347
1906. Price, T. M.

The preparation of emulsions of crude petroleum. Pacific Rural Press Vol.71,No.5,p.69,Feb.3,1906.

The R & H kerosene emulsion formula is given. The following crude oil emulsion is given: Crude petroleum 2 gals., water 1/2 gal., hard soap 1/2 lb., Crude Beaumont oil was used in this formula. This contains 40 to 50% oils boiling below 300° C and from 1 to 1.5% sulphur.

1348
[illegible]

Results of an Oil Spray in treatment of Box leaf miner (Morarthropalpus buxi Labou.)

Jour. Econ. Ent., vol. 16, no. 5, pp. 435-440.

See Supplementary abstract

1349
1897 - Quaintance, A. L.

Some Strawberry Insects.

Florida Agr. Expt. Sta. Bul. 42; pp. 551-600.

Kerosene emulsion formula: Hard soap 1/2 lb., kerosene 2 gals., water 1 gal. A dilution of 2 qts. stock to 6 gals. water killed thrips in considerable numbers, but slightly tainted the fruit. It was also used to keep the strawberry Paniera in check and was used on tht tarnished plant bug with success.

1350
1898 - Quaintance, A. L.

The Strawberry Thrips and Onion Thrips.

Florida Agr. Expt. Sta. Bul. 46, pp. 77-114.

Kerosene emulsion is made by the following formula: Soap (hard) 1/2 lb., water 1 gal., kerosene 2 gals., It is effective when used at 1-16 dilution.

1351
1898. Quaintance, A. L.

Preliminary report upon the insect enemies of tobacco in Florida.
Florida Agr. Expt. Sta. Bul. 48, pp. 150-188.

Kerosene emulsion was tried ~~and~~ at various strengths, but to be effective it should be used 1 - 6. A mechanical mixture of kerosene and water was tried, 10% kerosene was destructive to the adult suck fly, but was also injurious to the plants; 5% kerosene was also injurious to the plants.

1352
1898 - Quaintance, A. L.

Some Injurious Insects.
Florida Agr. Expt. Sta., Rept. for 1898-pp. 56-72.

Where the snowy chionaspis occurs on the China tree, and other deciduous plants, a thorough winter spraying with kerosene and water mixture might be efficacious.

1353
1900. Quaintance, A. L.

Insect notes for 1899.
Georgia Agr. Expt. Sta. Rpt. 1899, pp. 141-145.
10%, 15% and 20% mechanical mixtures, of kerosene and water were disappointing in their effect on Aphis mali. The lower strength did not kill the aphis and the higher strengths injured the trees. Practically the same results were obtained from the use of kerosene and water mixtures on the harlequin cabbage bug.

1354
1900 - Quaintance, A.L.
Observations on Diabrótica 12-punctata Oliv.

USDA Div. of Ent. Bul. 26, n.s. pp. 35-40.

Seed corn soaked in kerosene emulsion failed to germinate. The larvae were not affected by the kerosene.

1355
1901. Quaintance, A. L.

Insect Notes.

13th Ann. Rept. Ga. Agr. Expt. Sta. for 1900, pp. 361-371.

When seed corn was soaked in kerosene emulsion only 40% germinated.

1356
1902. Quaintance, A. L.

Report of the State Entomologist.
Rpt. Maryland State Hort. Soc. Vol. 5, pp. 22-27.
The use of petroleum and kerosene has been very unsuccessful. Injury has resulted mostly from the careless use of these materials. 20% kerosene emulsion has proven successful against the scale in summer use.

1357
1902 - Quaintance, A.L.
Directions for the Treatment of the San Jose Scale

Maryland Agric. Expt. Sta. Circ. Bul. 44, 6 pp.
For summer spraying kerosene emulsion was quite satisfactory. This was made as follows: Water 5 gals., ordinary hard soap 1½ lbs., kerosene (150 degrees) 10 gals., The soap should be dissolved in boiling water; then add the kerosene and emulsify by pumping the mixture into itself 10 or 12 minutes. Dilute with 35 gals. of water. This is a 20% emulsion. If applied on bright days it will do little injury to the foliage or fruit and will kill a considerable percent of scale. Where injury has resulted in certain localities, it should not be used at any time.

1358
1902 - Quaintance, A.L.
The Periodical Cicada and its Occurrence in Md.
Md. Agr. Expt. Sta. Bull. 87- pp. 65-116.
In cases of apple trees injured by the cicada, attention should be directed to the control of the wooly aphis which has a tendency to colonize in the wounds. Kerosene emulsion sparyed on the trees should keep the insects under control. The cicada may be controlled by spraying with kerosene emulsion very soon after they have shed their pupal skins, and while they are yet very delicate and helpless. Early each morning during the period of emergence ~~will offer~~ is the best time for the work.

1359
1906. Quaintance, A. L.

The principal insect enemies of the peach.

U.S.D.A. Yearbook 1905, pp. 325-348.

Kerosene and crude petroleum are used either pure, or in soap or mechanical emulsion with water for San Jose scale on peaches. Kerosene with a 150° flash test should be used. Crude petroleum should show from 43° to 45° Be.

1360
1907 - Quaintance, A. L

The trumpet leaf-miner of the apple.

USDA Bur. of Ent. Bul. 68, pt. III, pp. 23-30.

A thoro spraying with kerosene emulsion will destroy the larvae and pupae in the mines of the leaves and possibly the eggs scattered over the foliage.

1361
1907 - Quaintance, A.L.
The aphids affecting the apple.
U.S.D.A. Bur. Ent. Circ. 81; 10 pp.

A 20% kerosene or crude petroleum emulsion is according to the following: Whale oil or other soap 2⅔ lbs. Kerosene or crude petroleum 10 gals. water to make 50 gals. This is used after the trees are in foliage.

1362
1907. Quaintance, A. L.

Information about spraying for orchard insects.

U.S.D.A. Year Book 1906, pp. 267-288.

Kerosene and crude petroleum used pure, or in soap or mechanical emulsions with water are important insecticides against sucking insects, such as aphids and scale insects. Miscible oils are also used as a treatment for the San Jose Scale.

1363
1910 - Quaintance, A.L.
The San Jose scale and its control.
U.S.D.A. Bur. Ent. Circ. 124. 18 pp.

Kerosene and petroleum may be used pure or as soap emulsions. The R.& H. formula for making these emulsions is given. Miscible oils are taking the place of the kerosene and petroleum preparations.

1364
1912. Quaintance, A. L.

The peach bud mite.

U.S.D.A. Bur. Ent. Bul. 97, pt. IV, pp. 103-114.

Trees receiving a dormant spray of miscible oil were seriously injured by the mite.

1365
1912. Quaintance, A. L.

The leaf blister mite.

U.S.D.A. Bur. Ent. Circ. 154, 6 pp.

This insect may be controlled by using kerosene emulsion and miscible oils.

1366
1915. Quaintance, A.L.

The San Jose scale and its control.
U.S.D.A.Farmers' Bul. 650, 27 pp.
Kerosene and crude petroleum may be used pure on trees badly infested with the scale. They should be applied only on dormant trees and during bright days. Kerosene and crude petroleum may also be applied as emulsions made by the R & H formula. 20 and 25 % dilutions are used on dormant trees and a 10% spray for trees in foliage. Kerosene emulsion is preferable for trees in foliage. Miscible oils have taken the place of the kerosene and crude petroleum emulsions, as winter sprays.

1367
1922. Quaintance, A. L.

A promising new treatment for the San Jose scale.
U.S.D.A. Clip Sheet 193.

Experiments were made with oil emulsions at strength of 1/2% to 5% in Arkansas against the scale. It was found that one thorough spraying with a 2% emulsion was sufficient to kill the scale. The emulsion was made by the Government formula using Red Engine oil and potash fish oil soap. Any of following oils may be used: Diamond Paraffin, 180 Red Neutral, or Nabob.

1368
1917. Quaintance, A.L. & Baker, A.C.

Aphids injurious to orchard fruits, currant, gooseberry and grape.

U.S.Dept.Agric.Farmers' Bull. 804, 42 pp.

The R & H formula for making kerosene emulsion is given. This stock should be diluted 1 - 7 or 8 for aphids.

1369
1920. Quaintance, A.L. & Baker, A.C.

Control of aphids injurious to orchard fruits, currant, gooseberry and grape.

U.S.D.A.Farmers' Bul.1128, 48 pp.

The R & H formula for making kerosene emulsion is given.

1370
1905. Quaintance, A. L. & Brues, C. T.

The cotton bollworm.

U.S.D.A.Bur.Ent.Bul.50, 155 pp.

Crude petroleum gave negative results when placed on corn silks and ears.

1371
1910- Quaintance A.L. & Sasscer ,E.R.
The oyster shell scale and the scurfy scale.
U.S.D.A.Bur.Ent. Circ. 121; 15 pp.

Kerosene emulsion made by the R.&.H.Formula and used at 10% strength is effective for both scales on trees infoliage. For dormant use 20 to 25% emulsion must be used. Petroleum emulsion is made by the same formula as kerosene. Petroleum is not safe for trees in foliage. Miscible oils may be used on trees while dormant.

1372
1916. Quaintance, A.L. & Sasscer, E.R.

The oyster-shell scale and the scurfy scale.

U.S.D.A. Farmers' Bul. 723, 14 pp.

The R & H kerosene emulsion formula is given. Crude petroleum emulsion may be prepared in the same way.

1373
1907, Quaintance, A.L., & Shear, C. L.

Insect and fungous enemies of the grape east of the Rocky Mountains.

U.S.D.A. Farmers' Bul. 284, 48 pp.

The following kerosene emulsion formula is given: whale oil or other soap 2-1/2 lbs; kerosene (150 flash test) 5 gals water to make 50 gals. This is effective in controlling the young grape leaf hoppers without injuring the foliage.

1374
1921. Quaintance, A.L. & Shear, C.L.

Insect and fungus enemies of the grape.

U.S.D.A.Farmers' Bul.1220, 75 pp.

The R & H formula for making kerosene emulsion is given.

1375
1918. Quaintance, A.L. & Siegler, E.H.

Information for fruit growers about insecticides, spraying apparatus, and important insect pests.

U.S.D.A.Farmers' Bul.908, 99 pp.

Petroleum oil sprays include kerosene and crude petroleum, either pure or in emulsion, the distillates, and so-called miscible oils. See 1922 reprint of this bulletin for complete abstract.

1376
1922. Quaintance, A. L. & Siegler, E.H.

Information for fruit growers about insecticides, spraying apparatus, and important insect pests.

U.S.D.A.Farmers' Bul.908, 99 p. (Reprint).

1377
1922. Quaintance,A.L. & Siegler, E.H.

The more important apple insects.

U.S.D.A.Farmers' Bul. 1270, 95 pp.

Kerosene emulsion is a cheap and effective contact spray for sucking insects, but unless very well made and carefully used it may cause foliage injury. Soluble or miscible oils, homemade or propriatery, may be employed to advantage as dormant sprays for scale insects.

1378
1905. [illegible] .J.

Calif. Agr. Expt. Sta. Bul. [illegible]

The action of the distillate spray on the scale was to cause them to loosen their hold on the twig, and after a few days they may be seen hanging by their beaks for a time, when they finally drop off entirely. A shrivelling effect was also noted. The distillate spray had no injurious effect on the tree up to the time the bloom was well out. The Potash Distillate formula is 6 gals. of oil, 12 lbs. potash, or caustic soda, water 200 gals. The Straight Distillate formula is 10 gals. of oil and 200 gls. of water, which is a mechanical mixture, having the appearance of a milky fluid. The oil found to be the most satisfactory in S. Calif. is a 28° gravity oil.

1379
[illegible] J.

[illegible] 55 [illegible]

Considerable injury to the tree and fruit occurs from spraying. Oil burning occurs as spots on the upper side of the fruit in the direct sunlight. Oil sprays include kerosene and distillate oils. A mechanical mixture of distillate is improved by adding a small amount of soap, which adds to the penetrating and spreading power of the spray. Distillate emulsion formula is 4 gals., tree distillate (31° - 32°), liquid soap ¾ gal. or hard soap 4 lbs; Water 200 gals. The kerosene emulsion formula is: Oil (42°) 15 gals; liquid soap 3/4 gal. or hard soap 4 lbs; water 200 gals. Kerosene emulsion proved the safest from the standpoint of injury to the tree or fruit and at the same time effective in killing the scales.

1380
1[illegible]

Quinn, G.

The oyster-shell bark-louse

Jr. Dept. Agr. So. Aust., Vol. 3, No. 11, pp 639-647.

The R & H formula is given. The following red oil formula is given; 1 lb. common soap, 1 gal [illegible] 1 gal water. This is emulsified in the same way as the R & H formula, and is diluted for [illegible]ing by adding 14 gals soft water.

1381 The [illegible] in [illegible]

[illegible]

[illegible] on oranges, kerosene and other petro- [illegible] spraying oil emulsions have been used with fair [illegible].

1382
1913. Ranck, E. M.

Horn flies and other insects.

Miss. Agric. Expt. Sta. Circ. on diseases prevalent among horses and cattle in Mississippi.

The following formula has been found effective for spraying milk cows and animals that can be corralled: Cotton seed oil, 2 quarts, kerosene, 1 quart, crude carbolic acid, 1 pt., oil of tar 10 ozs., and oil of pennyroyal, 1 oz.

1913 - Reakes, C.J.
1383
Notes regarding ticks found on farm animals in New Zealand.

New Zealand Jl. Agric. [illegible]

Spraying mixtures tried were as follows: (a) kerosene 1/2 pt: linseed oil 1/2 pt: sulphur 1 oz (b) kerosene 10 oz; lard 10 oz: tar 2 oz, sulphur 1 oz. These two mixtures [illegible] ultimately destroying the ticks, proved [illegible] in their action.

1384
1914. Rees, R. W.

The spraying campaign.

Trans. Mass. Hort. Soc. for 1914, pt.1, p.87.

Miscible oil is recommended for trees badly infested with scale. It is very effective and is easy to apply.

1385
1917 - Regan, W. S.

Potato plant lice and their control.

Mass. Agric. Expt. Sta. Bul. 177, pp.135-146.

Kerosene emulsion formula: ½ lb. hard soap or ½ pt. liquid soap is dissolved in 1 gal. boiling water. This is poured into 2 gals. kerosene and churned back and fourth with a spray pump until a creamy mass is formed and no free oil is present. The emulsion should be diluted 1-9 for plant lice. Trials with this emulsion proved disappointing, as not more than 90% of the insects were killed. There is danger of injury if this emulsion is improperly made.

Miscible or Soluble Oils: One of the standard brands was used at four dilutions, 1-25, 1-40, 1-~~5~~50 and 1-66. This material at all dilutions showed very high killing efficiency, but even at the greatest dilution (1-64) showed distinct oil injury to the potato foliage.

1386
1918 - Regan, W. S.

Late Dormant vs. Delayed Dormant or Green Tip Treatment for the Control of Apple Aphids.

Mass. Agric. Expt. Sta. Bull. 184, pp. [illegible].

Tests against the living aphids with two brands of miscible oils showed a 100% kill for each. The killing of the aphid is instantaneous. The action is evidently of a strictly chemical nature. No more injury results from the use of oils at full dormant season strength during the delayed dormant period than from the use of lime sulphur. At this period both laboratory and field tests showed only slight-tip injury.

1387
1922 - Regan, W.S.

The fruit-tree leaf-roller in the Bitter root Valley.

Montana Agric. Expt. Sta. Circ. 109, 13 pp.

Regan, W.S.
See Bull. 154 of this station.

1388
1923 - Regan, W.S.

The Fruit-tree Leafroller in Bitter Root Valley.

Montana Agr. Expt. Sta. Bul. 154; 56 pp.

See Supplementary abstract

1389
1926. Regan, W. S.

The present status of oil spraying in the Northwest.

Jour. Econ. Ent., Vol.19, No.1, pp.86-94.

Investigations in the Northwest have shown that the kind of emulsifier and method of emulsification of spray oil are practically as important as the oil itself from the standpoint of safety and efficiency. A highly refined, colorless oil emulsion has proved a safe and effective ovicide for the codling moth, and has been used successfully as a summer control for the San Jose scale. The use of any dormant type of oil spray, even at low percentages, during the growing season is a dangerous practice.

1390
1903 - Repp, John J.

The Chicken Mite.

Iowa State Coll. Agr. Expt. Sta. Bul. 69, p.287-294

The Mites may be exterminated by thoroly spraying the building and its contents with kerosene emulsion made by dissolving ½ lb. soap in 1 gal. water, heated to boiling adding 2 gals. of kerosene and emulsifying by stirring. For use dilute with ten volumes of water. Kerosene emulsion kills both the mites and their eggs, when it comes in contact with them.

1391
1897. Reymond, J. B.

Experiments with woolly aphis or American blight.

Agr. Gaz. N. S. Wales, Vol.8, Pt.2, pp.120-1.

A pound of wool soaked in kerosene was placed around the roots of trees. Apparently this was effective. Kerosene emulsion was not effective.

[illegible] - [illegible], W. H.
1392
Red mite and Woolly aphis on Nursery fruit trees.

New Zealand Jl. Agri., Vol.XX, No. 4, pp 250-251.

Woolly aphis control is assured by a 3 min., immersion in oil not weaker than 1-10. Red mite control cannot be assured with oil weaker than 1-6. Root immersion of apples and pears is not injurious.

1393
1915. Richards, P. B.

Methods and materials for control of insect pests. Part VII.

Agric. Bull. Fed. Malay States, Kuala Lumpur, Vol.III, No.11, Aug.1915, pp.429-436.

The R & H formula is given.

1394
1892 - Richman, E.S.

Notes on insects.

Utah Agr. Coll. Expt. Sta. Bul. 14: pp. 7-11.

Kerosene emulsion (Cook formula) is recommended for plant lice when diluted 1-15.

1395
1880. Riley, C. V.

Insecticides now in use in the South for the protection of cotton.

American Entomologist, Vol.III, No.10, pp.245-7.

Nothing is more deadly to the insect in all stages than kerosene or oils of any kind, and they are the only substances with which we may hope to destroy the eggs. The mixing of oil and water has been solved by first combining them with either fresh or spoiled milk. This may be diluted to any extent.

1396
1880. Riley, C.V.

Insecticides for the protection of cotton.

Scientific American, Vol.XLIII, No.16, Oct.16, 1880.

Nothing is more deadly to the insects than kerosene or oils of any kind, and they are the only substances with which we may hope to destroy the eggs. The oil is combined with milk to make it dilute easily.

1397
1882. Riley, C. V.

Emulsions of petroleum and their value as insecticides.

Rural New Yorker, Vol. 41, No.1715, pp.833-4.

The R & H formula for making kerosene emulsion with soap and sour milk are given.

1398
[illegible], C. V.

[illegible]

Report of the Entomologist. Report of the Commissioner of Agriculture for 1883. pp.107-130.

Kerosene emulsified to limit of dilution with water was found of great value in the cabbage fields.

1399
1883-Riley, C.V.

Reports of experiments chiefly with kerosene upon the insects injuriously affecting the orange tree and the cotton plant.
USDA Div. Ent. Bul. 1, 62 pp.

Experiments made on purple scale eggs showed that kerosene emulsion 1-9 was not effective. This same strength is sufficiently strong for long scale. The following emulsions were used in experiments on orange scale insects. (1) 4 lbs. whale oil soap dissolved in 1 gal. water with heat; to this was added 1 gal. kerosene. (2) Same as no.1. only rosin soap was used. (3) Six lbs. fresh Zamia root were grated and boiled in 3 gals. water; this was made alkaline by adding 3 oz. salsoda. After boiling 1 hr.. the mucilage was strained, and while hot 1 gal. kerosene was added, with agitation. (4) milk fresh or sour was used for making emulsions containing 25,33, and 50 % kerosene. (5) Condensed milk was used to make a 505 kerosene emulsion. (6) 2 lbs. milk diluted with 6 pts. hot water. To 6 pts. of the milk solution 1 gal. kerosene was added and the mixture emulsified. The emulsion containing soap were more effective at all dilutions than those containing the Zamia extract or milk. After a rain or in the evening all applications were more effective. Two applications of 1 ro 1.5% were more effective than one application of 5%. A 1% kerosene, thoroly applied was fatal to all larvae of the cotton worm that is reached and harmless to the plant.

1400
1883. Riley, C. V.

Emulsions of petroleum and their value as insecticides.

Proc.Amer.Assoc.Adv.Sci.for 1882, Vol.31, p. 469-70.

Ordinary bar soap scraped and rubbed into paste at the rate of 20 parts soap, 10 parts water, 30 parts kerosene and 1 part fir balsam, will make, when diluted with water, an emulsion stable enough for all practical purposes. Soap emulsions are less satisfactory and efficient than those made from milk.

1401
1885. Riley, C. V.

Kerosene emulsions.

Report of the Entomologist for the year 1884, [illegible]

The R & H method for making kerosene emulsion is discussed.

1402
1886. Riley, C. V.

Report of the Entomologist.

Ann.Rept.of the U.S.Dept. of Agr.for the year 1885. pp.228-258.

Kerosene emulsion prepared by the R & H formula and diluted 1-2 was sprayed on a mixed lot of [illegible] and adults. The emulsion at once [illegible] all molting and transformation, and the soft wings hardened in shapeless forms. Dilutions of 1-4 and 1-3 were not so effective.

1403
1886 - Riley, C.V.

Reports on experiments with various insecticide substances, chiefly upon insects affecting garden crops, made under the direction of the entomologist.
USDA. Div. of Ent. Bul. 11- 34 pp.

Kerosene emulsion made of equal parts kerosene, molasses and water was thought at first to give a good emulsion, but latter experiments showed that it was not equal to the soap emulsion. This emulsion destroyed 80% of the cabbage worms in 1 experiment on cabbage. On woolly aphid it was at first thought to be successful but later examinations showed that aphids were as plentiful as before. Apple leaf skeletonizer completely vanished after spraying with the kerosene molasses emulsion.

1404
[illegible], C. V.

Report on experiments on [illegible] scale insects.

Rept. of the Entomologist. Ann.Rept.of the U.S. Dept.Agr.for the year 1887. pp.1[illegible]-1[illegible]7.

[illegible]

1405
1889. Riley, C. V.

The red bug or cotton stainer.

Insect-Life, Vol.I, No. 8, pp.234-241.

The R & H formula is effective for killing the eggs of this insect.

1406
1889. Riley, C. V.

Some insect pests of the household.

Insect Life, Vol.II, No.4, p.104-108.

Benzine is effective for the bedbug.

1407
1889. Riley, C. V.

Some insect pests of the household.

Insect Life, Vol.II, No.5, pp.127-130.

Benzine is recommended for the buffalo carpet beetle.

1408
1889. Riley, C. V. & Howard, L. O.

The ox warble.

Insect Life, Vol.II, No.6, pp.172-177.

Kerosene emulsion is recommended as a means of protection against the flies.

1409
1890. Riley, C. V.

Some insect pests of the household.

Insect Life, Vol.II, Nos.7 & 8, pp.211-215.

Benzine is recommended for the clothes moths.

1410
~~1889~~ 1890 Riley, C.V.

Insect Life, Vol.2, 1889/90, p.300

Kerosene against Rose chafer on grape vines and rose bushes.

1411
1890. Riley, C. V.

Report of the entomologist for the year 1889.

Ann.Rept.Dept.Agr.for 1889, p.331-60.

Kerosene emulsion, with 2 or 3 ozs. of dry sulphur added to each gallon of the wash, may be used as a remedy for the six spotted mite of the orange.

1412
Riley, C.V.
1890.
Insect Life. Vol. 3, No. 5, pp.183-196.

Note on the first use of kerosene emulsion. Kerosene was used against Diaspis pentagona on mulberry.

Crude tar oil, naphthalene, quick lime, and water were used against Grape phyllozera infesting grapes.

1413

Riley, C. V.
1891. The kerosene emulsion: Its origin, nature and increasing usefulness.
Proc. Soc. Agr. Sci. pp. 83-98.

See Supplementary abstract

1414
1891. Riley, C.V.

Condensed information concerning some of the more important insecticides.

U.S.D.A.Div.Ent.Circ.1, 7 pp.

The R & H and milk formulas for kerosene are given.

1891 - Riley, C.V.
1415 Condensed information concerning some of the more important insecticides.

USDA Bur. of Ent. Circ. 1 (2nd ser). 7 pp.

The R & H formula for kerosene emulsion is given.

1416
1891. Riley, C. V.

The hop plant-louse and the remedies to be used against it.

U.S.D.A.Div.Ent.Circ.2, 7 p.

The R & H formula is given.

1417
1891 - Riley, C.V.
The hop plant louse.

USDA Bur. Ent. Circ. 2 (2nd ser), 7 pp.

The R & H kerosene emulsion formula is given.

1418
1891. Riley, C. V.

Kerosene emulsion & pyrethrum.
Insect Life, Vol.4, Nos.1 & 2, p.32-4.
A discussion of methods for making kerosene emulsion and pyrethrum. Dr. Menke's method as given in Bul. 15 of the Arkansas Agr.Expt.Sta.consists of the kerosene extract of pyrethrum made into an emulsion with soap and water. Gillette's emulsion consists of an aqueous solution of pyrethrum made into an emulsion with soap and kerosene. There seems to be very little difference between results obtained from the two methods.

1419
1893 - Riley, C.V.

Injurious Insects of Maryland.
Maryland Agric. Expt. Sta.Bul. 23, pp. 70-94.

The best remedy for the green June beetle is kerosene emulsion diluted 1-15 and subsequently washed down into the soil with a copious watering. It will kill all the grubs which it touches and at the same time will penetrate sufficiently deep into the ground to reach grubs which are farthest down. A dilution of 1-8 will not injure grass. Dilute kerosene emulsion is recommended for the melon aphis. The larvae of the asparagus beetle may be killed by the use of kerosene emulsion if applied two or three times during July and August.

1420
1895 - Riley C.V.

The San Jose Scale.
Maryland Agr.Expt.Sta. Bul. 32, pp. 85-111.

Results taken from L. O. Howard's Div. of Ent. Circ. 3, 2nd ser. Apr. 1894, are given in this bulletin.

1421
1889. Riley, C. V. & Howard, L. O.

The Florida wax-scale in California.

Insect Life, Vol.I, No.10, p.325-6.

It is readily killed by kerosene emulsion spray, which should be applied while the majority of the insects are young.

1422 1889 Riley, C.V. & Howard, L.O.

Insect Life, Vol.1, No.12, p.387

Petroleum against Grape-vine Leaf-hopper infesting grape

1889 Riley, C.V. & Howard, L.O.
1423

Insect Life, Vol.2, No.6, p. 170

Kerosene against Mediterranean Flour Moth infesting flour mills.

1890? Riley, C.V. & Howard, L.O.
1424

Insect Life, Vol. III, No. 1, p. 30

Benzole against Phytorcoris sp. on grape

1891? Riley, C.V. & Howard, L.O.
1425

Insect Life, Vol.3 Nos. 7&8 p.334

Benzine against grain insects in stored corn.

1426 1892 Riley, C.V. & Howard, L.O.

Insect Life, Vol.4, Nos. 9 & 10, p.330

Kerosene against mosquitoes in pools

1427
1892. Riley, C. V. and Howard, L.O.

General notes.

Insect Life, Vol.IV, Nos.9 & 10, pp.335-352.

Kerosene emulsion to be effective must be used on the hop plant lice while they are on the plum trees early in the spring.

1428
1892. Riley, C. V. and Howard, L.O.

Notes from correspondence.

Insect Life, Vol.IV, No.11 & 12, pp.399-401.

Kerosene emulsion was better than quassia for the hop aphid. Drenching the soil with dilute kerosene emulsion was the best remedy for Oniscus that are damaging plants.

p.401. Kerosene against Sow bugs on young rose bushes.

p. 408. Benxine & Naphthalene against insects on tea bushes.

1892? Riley, C.V. & Howard, L.O.
1429

Insect Life, Vol.5, No.2, p.144

Kerosene against mosquitoes

1430
1893. Riley, C. V. & Howard, L. O.

The glassy-winged sharp-shooter.

Insect Life, Vol.V, No.3, pp.150-154.

The plants affected by this insect may be protected by spraying with a dilute solution of kerosene emulsion.

1431
1893. Riley, C. V. & Howard, L. O.

The orange aleyrodes. The pear tree psylla.

Insect Life, Vol.V.No.4, pp.219-230.

Kerosene emulsion is recommended as a remedy for these pests.

1432
1893. Riley, C. V. & Howard, L. O.

Kerosene emulsion against the hop louse.

Insect Life, Vol.6, No.1, p.41.

Kerosene emulsion used much stronger than has been recommended in various bulletins showed no bad effects on hop vines.

1433
1894. Riley, C. V. & Howard, L. O.

Kerosene emulsion against sheep ticks.

Insect Life, Vol.6, No.3, p.279.

Kerosene emulsion was used with much success on sheep ticks. It has the advantage of cheapness, ease of application, harmlessness to animals and efficiency against the ticks.

1434
1894. Riley, C. V. & Howard, L. O.

Kerosene against mosquitoes.

Insect Life, Vol. 6, No. 4, p. 327.

A mixture of kerosene and mutton tallow smeared on burros keeps mosquitoes away.
p. 294. Kerosene against Diaspis lantus on peach.

1435
1894. Riley, C.V. & Howard, L.O.

Kerosene emulsion as a deterrent against grasshoppers.
Insect Life, Vol. VI, No. 5, p. 379.

A spraying of an orchard resulted in the apparent destruction of none of the grasshoppers, but they left and did not return to it for days.

1436
1917. Ritchie, A. H.

Pointers on the horn fly.

Jl. Jamaica Agric. Soc., Vol. XXI, No. 2, pp. 46-48.

Kerosene emulsion sprayed on cows will repel the flies for a day or two only.

1437
1917. Ritchie, A. H.

Hog lice.

Jl. Jamaica Agric. Soc., Vol. XXI, No. 3, pp. 91-92.

Kerosene emulsion, 10 % and 1 lb. rancid cheese, lard or butter in which 1/2 pt. of kerosene is thoroly mixed are recommended as treatments for hog lice.

1438
1917. Ritchie, A. H.

Scale on yams.

Jl. Jamaica Agric. Soc., Vol. XXI, No. 9, pp. 358-359.

Kerosene emulsion made by the R & H formula using 3/4 lb. soap may be tried in as strong dilution as 1-4.

1439
1901. Ritzema Bos, J.

Het dooden van de eieren van den plakker (Stamuil of Zwamvlinder) door middel van petroleum.

Tijdschrift Plantenziekten 7, No. 5-6, pp. 162-165.

Cf. Dr. Jacobi, Reichsgesundheitsamt Flugblatt No. 6. This is a Dutch translation of same.

1440
1920. Robertson, J. C.

Report on the anti-malaria campaign at Taranto during 1918.
Jl. R.A.M.C., London, Vol. XXXIV, No. 5, pp. 444-467.

Kerosene and waste engine oil were used in places where draining could not be accomplished.

1441
1924 Robinson, R.H.

The use of skim milk in the preparation of certain spray materials. Jour. Econ. Ent. vol. 17, No. 3, pp. 396-400.

See Supplementary abstract

1442
1925. Robinson, R. H.

Spreaders for spray materials and the relation of surface tension to their spreading qualities.
Jl. Agr. Research, Vol. 31, No. 1, pp. 71-81.

No definite proportional relationship could be established between surface tension values of spreader solutions and the observed spreading properties of the different substances. However a solution having a low surface tension or a low interfacial tension to oil probably has spreading properties. Of the materials tried, water soluble protein substances gave best spreading at lowest concentration for the greatest number of surfaces tested. Skim milk, neutralized

with hydrated lime, and certain other milk products appear to be the best material for practical purposes. The concentration of a spreader solution that will give best results depends upon a number of variable factors, such as the type and age of the surface to be sprayed, the force used, and climatic conditions.

1443

Röderer, W.R. (Determination of the iodine value of mineral oil products.) Ztschr. angew. Chem. Jahrg. 33, 1920, pp. 235-237. Jour. Soc. Chem. Ind., vol. 39, Nov. 30, 1920, p. 741A. On determinations with the Hübl-Waller and Wijs iodine solutions.

1444
1919. Rodda, T. E.

Control of red mite and black spot.

Jour. Dept. Agric. N. Zealand, Vol. 18, No. 6, p. 344-347.

Oil 1-30 used alone in advanced pink stage gave very satisfactory results on the red mite.

1445
[illegible] - Rodda, T. E.

[illegible]

[illegible] Vol. XX, [illegible] 372-374.

[illegible] oil 1-8 & 1-2 during dormant [illegible] -ctive up to a certain [illegible] strengths applied during bud [illegible] r and advanced cluster.

1446
1895 - Rolfs, P. H.

The San Jose Scale.
Florida Agr. Expt. Sta. Bul. 29, pp. 90-111.

Kerosene emulsion formula: Soap (hard or whale oil) 1/2 lb., water 1 gal., kerosene 2 gals., kerosene emulsion is not recommended as the most effective remedy

1447
[illegible]

1448
1919. Ross, W. A.

The rose midge in Ontario.

Agric. Gaz. Canada, Vol. VI, No. 2, pp. 137-138.

The walks of greenhouses should be sprayed with a 5% kerosene emulsion to kill any larvae which might fall from the plants to the walks.

1449
1907. Ross, E. H. & Ross, H. C.

An automatic oiler for the destruction and prevention of mosquito larvae in cesspools and other collections of water.
Ann. Trop. Med & Parasit. Vol. I, No. 2, pp. 165-167.
The empty kerosene tins in which the crude oil is supplied are used. Two spouts are placed opposite one another with either end near the rim. A sand filter is placed in one spout. When sunk, one end assumes an upward position. The can holds 3-1/2 liters of oil. The oil goes out the upward end and water enters the lower. About 50 cc of oil comes out per day. This will last approximately 2 months.

1450
1919. Royer, B.F. & Emerson, C. A.

Mosquito eradication in Southeastern Pennsylvania.

Amer. Jl. Public Health, Vol. IX, No. 5, pp. 327-332.

Pools that could not be easily drained were oiled.

1451
1918 - Ruggles, A. G.

Spraying.
Minn. Univ. Farm. Circ. 48, 16 pp.

Nicotine oleate may be made more effective by emulsifying an oil with it. 10 parts of an oil as cottonseed or kerosene are mixed with 1¼ parts of "red oil" to which is then added 2½ parts of 40% free nicotine solution. Shake thoroughly then add 10 parts more of water, shaking again. For mealybug, white fly and soft scale dilute with soft water to make 500 parts.

1452 1906 - Rumsey, W. E. & Brooks, F. E.
A test of different brands for the San Jose scale.
W. Va. Agr. Expt.Sta.Bul. 107, pp. 347-354

Target brand scale destroyer, Kil-O-scale, & Scalecide were used on San Jose scale with good results. Scalecide was the least satisfactory. These were used on dormant trees at 1-20 dilution

1453
1912 - Rumsey, W. E., & Peairs, L.M.
Report of the Entomologists,
W. Va. Agr.Expt.Sta. Rpt. 1911-1912; pp. 20-24.

Soluble oil 1-36 and 1-50 killed all green aphids but injured the foliage. The spraying was done in May.

1454
1914. Runner, G. A.

The so-called tobacco wireworm in Virginia.

U.S.D.A.Bul.78, 30 pp.

Tobacco plants were dipped in a weak kerosene emulsion and then planted. When examined later none were found infested. Kerosene and sand was not effective.

1455
1908. Russell, H.M.

Experiments for the control of the red spider in Florida (Tetranychus bimaculatus Harv.)
Jour. Econ. Ent. vol. I, no. 6 pp. 377-80

See Supplementary abstract

1456
1909 - Russell, H.M.
The greenhouse thrips.

USDA Bur. Ent. Bul. 64, pt.6, pp. 43-60.

Kerosene emulsion might be effective against the greenhouse thrips when used 1-10;

1457
1912 - Russell, H.M.
The bean thrips.
USDA Bur. Ent. Bul.118; 49 p.

A distillate oil emulsion is made according to formula; hot water 12 gal., fish oil or whale oil soap 30 lbs., distillate oil (raw) 30° - 34° Be 20 gals., In case the thrips threatens fruit trees, a 5% solution of this emulsion is effective.

1458
1912 - Russell H.M.
The greenhouse thrips.
U.S.D.A. Bur. Ent. Circ. 151; 9 pp.

Kerosene emulsion diluted 1-10 is effective against the greenhouse thrips.

1459
1911. Sackett, H. S.

Consumption of wood preservatives and quantity of wood treated in the U.S. in 1910.

U.S.D.A.Forest Serv.Circ.186,4 pp.

Small quantities of crude oil were used in preserving timber in the U.S.

1460
1915. Salmon, D.E.

Polvos insecticidos y su aplicacion.
Gaceta Rural, Vol. 8, No. 95, p. 687.
Chickens are dusted for lice with a mixture of 3 parts gasoline, one part phenol crystals, absorbed in sufficient gypsum to make a fairly dry powder.

1461
1865. Sanborn, F. G.

The habits of insects in their relations to man.
12th Ann.Rept.Secr.Mass.Board Agr.for 1864,p. 139-160.
Petroleum and coal oil have been applied to tent caterpillars and effectually dislodged them. Petroleum was used for various roots maggots without injuring the plants.

1462
1905 - Sanders, J. G.
The cottony maple scale.
U.S.D.A. Bur. Ent. Circ. 64; 6 pp.

Kerosene emulsion made by the R & H formula is recommended for winter treatment at 25% strength. A strength of kerosene emulsion sufficient to kill the scale in summer will injure the trees.

1463
1907 - Sanders, J.G.
The terrapin scale.

U.S.D.A. Bur. Ent. Circ. 88; 4 pp.

Kerosene emulsion at a 20 to 25% strength is the most effective remedy for this scale. The R.& H. formula is given.

1464
1909- Sanders, J.G.
The euonymus scale.
USDA, Bur. Ent.Circ. 114; 5 pp.

Kerosene emulsion is effective against the euonymus scale in summer when diluted to less than 15%. For winter a 20 or 25% dilution may be used.

1465
1925. Sanders, J.G.

Miscible oils and oil emulsions.

Jour. Econ. Ent. vol. 18, No. 2, pp. 287-292

See Supplementary abstract

1466
1916. Sanders, J.G. and Fracker, S.B.

Lachnosterna records in Wisconsin. Jour. Econ. Ent., vol. 9, no. 2. pp. 253-261.

Kerosene emulsion "at ordinary strength" does not affect larvae when the soil is saturated with it.

1467
1900 - - Sanderson, E. Dwight.

Crude petroleum for the San Jose scale. In Report of the Entomologist, 12th Ann. Rept. Del. Coll. Agr. Expt. Sta. for 1900, p. 201.

Tests were made with pure crude petroleum and 25% oil on pear trees. Both were equally effective in killing the scale. No injury resulted.

1468
1900 - Sanderson, E. Dwight.

The strawberry root louse; the destructive pear louse in Delaware.
Delaware Coll. Agr. Expt. Sta. Bul. 49, pp. 1-13, Part I and Part II, pp. 14-24.

For the strawberry root louse use a kerosene emulsion. Kerosene 2 gals., whale oil soap 1-2 lbs., or 1 qt. soft soap; water 1 gal. Make in the regular way. Dilute these with 10 to 15 parts water. Plants should not be left in this emulsion more than two or three minutes and should be weell washed in fresh water. 25% kerowater was sprayed on an acre of peas. A very lagge majority of the lice were killed with no injury to the vines.

1469
1903 - Sanderson E. Dwight.

San Jose Scale. Delaware Coll. Agr. Expt. Sta Bul. 58, 20 pp.

S. corroborated the work of W.M.Scott of Georgia in the use of kerosene emulsion, also that of Prof. Forbes, The emulsion was prepared by the formula; 3-1/4 lbs. potash whale oil soap; 6-1/4 gals. soft water; 12-1/2 gals.oil. Crude petroleum is very effective. The oil should not have a specific gravity of less than 43° Baume. The spray should be applied by means of a pump which will mix it with water at the rate of 25% oil. A very fine mist should be applied. Upon apples and pears the crude petroleum can be applied pure. Pure oil is not advised on peaches or plums. Never use enuf oil to make tree drip or allow the oil to collect around the base. The crude petroleum has the advantage of leaving a dark gummy residue on the bark. This prevents the young insects from establishing themselves upon it until late summer. Refined kerosene 150 Flash test may be used in a 20% midture. It is not as good as crude petroleum.

1470
1900. Sanderson, E. D.

Notes from Delaware.

U.S.D.A.Div.Ent.Bul.26,n.s.,pp.66-72.

25% kerosene and water mixture was used for the green pea louse. Very slight injury resulted from its use.

1471
1903 - Sanderson, E. Dwight.

Report of the Entomologist, Delaware Coll. Agr. Expt.Sta. Rpt. for 1902, pp. 109-151.

The addition of 15% or 20% - 150 test kerosene is not deleterious to the insecticidal value of the arsenite or the fungicidal value of the Bordeaux mixture, but the same strength of crude petroleum cannot be recommended for use when spraying for the codling moth. For apple plant lice 15% and 20% kerosene with standard Bordeaux mixture was fairly effective. 15% and 20% and 25% crude petroleum was added to standard Bordeaux mixture. All strengths were quite effective, almost all the lice being killed. No foliage was injured in these tests. For San Jose scale 20% cruid petroleum and 20% kerosene was put on in the fall. The kerosene was not as effective as the cruie petroleum nor as satisfactory. The foliage was not injured.

1472
1902. Sanderson, E. D.

Notes from Delaware.

U.S.D.A.Div.Ent.Bul.37,n.s.,pp.97-102.

15% kerosene mixed with water or Bordeaux mixture has not proven very satisfactory for destroying apple aphids. 20% kerosene is better. A 15 or 20% crude petroleum is quite effective and does not injure the trees.

1473
1903 - Sanderson, E. Dwight.

Report of the Entomologist, 13th Ann. Rpt. Dela - Agr. Expt. Sta., 1902, pp. 127-199.

Kerosene and crude petroleum both dilute and pure were used in experiments for controlling aphids infesting apple. Trees sprayed with 15% crude petroleum and with pure crude petroleum showed no injury. Tho plenty of aphids were on these trees, there seemed to be fewer than on other trees. 15% crude petroleum tended to collet in drops. Spraying was done with a Gould Knapsack Kerowate ~~spray~~ pump. Tests showed that the pump gave from 4 to 5% less oil than indicated. Crude petroleum seemed to be more efficacious than kerosene and at 15% is satisfactory while kerosene should be used at 20%. For the strawberry root louse plants were dipped in kerosene emulsion made from ½ lb. whale oil soap (Good's potash #3), 2 gals. kerosene and 1 gal.water, diluted 8 times. This was too strong. Doubtless when diluted 12 times,it would be better. 15% kerosene was ineffectual against the green pea louse on a hot day, evaporating so rapidly that no injury wasdone to the lice; 25% killed all the lice it hit and did no injury to the vines ~~as ... as it was tried~~. Kerosene 15% was mixed with Bordeaux mixture or the arsenite. 15%, 20% and 25% crude petroleum was sprayed on plum and pear trees infested with San Jose scale; 15% killed most of the young but adults were alive; at 20% over 95% dead; at 25% no live scales were found. Crude petroleum at 15% was more effective than 20% kerosene on apple aphis. The R & H kerosene emulsion was used for the strawberry root louse, diluted 1-8, crude petroleum 15,2 and 25% killed practially all the San Jose scale; no injury to the trees resulted.

1474
1903 - Sanderson, E. Dwight.

The Codling Moth.
Delaware Coll. Agr. Expt. Sta. Bul. 59, 22 pp.

The addition of 15 or 20% F. 150 flash test kerosene is not deleterious to the insecticidal value of the Bordeaux mixture, but the same strength of crude petroleum cannot be recommended for use when spraying for the codling moth.

1475
1905. Sanderson, E. D.

Miscellaneous cotton insects in Texas.

U.S.D.A.Farmers' Bul.223, 24 pp.

Kerosene emulsion is recommended for plant lice.

1476
1906? Sanderson, E.D.

U.S.Dept.Agr. Bur.Ent. Bul. 57, p. 21

Kerosene against Grasshoppers on grain and cotton.

1477
1907. Sanderson, E. D.

A spray nozzle for the mechanical mixture of oil with water or other liquids.

U.S.D.A. Bur. of Ent. Bul. 67, pp.112-116.

The water and oil are led to the nozzle by separate lines and here they are united thru a disc having holes of the same size. A disc with two holes for the water to enter and one hole for the oil will deliver 33-1/2% oil, 3 holes for water and 1 for oil will deliver 25% oil. The % oil will then depend on the number of openings for the water to enter. Both oil and water enter under the same pressure.

1478
1908 - Sanderson, E. Dwight.
The apple leaf-aphis.
New Hampshire Agr. Expt. Sta. Circ. 3, 6 pp.
A spray of 10 or 15% kerosene emulsion will kill aphids if applied so as to hit them. The emulsion is made by slicing up 1½ lbs. of hard soap and dissolving it in 5 gals. of hot water. Place this in the spray pump barrel and add 7½ gals. of kerosene. Then thoroly emulsify the mixture by pumping it back into itself for 5 to 10 minutes. By adding 37½ gals. of water, there will be a 15% kerosene emulsion.

1479
1912. Sanderson, E.D.

Insect pests of farm, garden and orchard.
John Wiley & Sons,N.Y. 684 pp.
The R & H formula for kerosene emulsion is given. Pure kerosene should never be used on foliage because of severe injury. Crude petroleum seems to be less injurious than kerosene. Crude oil for use an an insecticide should have a sp. gr of 43 to 45°Be.

1480
1894-1897. Sasaki, C.

The scale insect of mulberry trees.

College of Agr.,Tokyo,Japan,Bul.,Vol.2,No.3, pp.107-124.

Petroleum is one of the most efficacious and most practicable for destroying the scale ~~when~~ in dry weather when the active larvae are crawling about on the bark without protection.

1481
1919. Sasscer, E.R. & Borden, A.D.

The rose midge.

U.S.Dept.Agric. Bull.778, 8 pp.

Where earth walks are present in rose greenhouses, kerosene emulsion should be sprayed on them to prevent the rose midge larvae from entering the ground.

1482
1916. Saunders, Winifred H.

Fly investigation reports. III. Investigations into stable manure to check the breeding of house-flies made during the year 1915 for the zoological soc. of London.
Proc.Zool.Soc.London,1916, Part III, pp.469-479.
Miscible oil, both light and heavy, were not effective on fly larvae. Mineral oils the same.

1483
1917 . Savage, C. G.
The cabbage aphis (Aphis brassicae)
Jl. Dept. Agri. S. Australia, Vol. XX,No. 7, p. 581.- Kerosene emulsion will destroy this cabbage insect.

1484
1902. Scheidt, R. C.

Report of the Entomologist.

Penna.Dept.Agr.Rpt.1901,pt.1, pp.325-328.

On trees heavily encrusted with San Jose scale, kerosene was used freely and with success.

1485
1920. Schlupp, W. F.

Mylabris beetles.

Jl. Dept. Agric. Union S. Africa, Vol.I, No. 8, pp. 741-749.

The beetles are hand picked and placed in a vessel of water with a film of paraffin on it.

1486
1916. Scholl, E. E.

Field work. Division of Entomology.

Ninth Ann.Rept.Commiss.Agr.State of Texas.pp. 11-15.

A 10% kerosene emulsion was effective against the chinch bug. A 10% kerosene emulsion was also effective against plant lice and was injurious to the blossoms of melon vines.

1487
1917 - Schöppe, W.F.

Control of poultry lice & mites.
Univ. Montana Agric. Expt. Sta. Circ. 64, 65-71.

The following formula is good for washing or spraying chicken houses, 4½ gals. of water, 1 qt. of zenoleum and 1 qt. kerosene. Since the mites are in the crevices of the building it is necessary to work the solution well into these places. Zenoleum is a coal-tar dip.

1488
1893. Schwarz, E. A.

The red-legged flea-beetle.

Insect Life, Vol.V, No.5, pp.334-342.

Milk & kerosene emulsion diluted 4 times was used with a fair degree of success against the flea beetle.

1489
1918. Scott, E.W., Abbott, W.S. & Dudley, J.E., Jr.

Results of experiments with miscellaneous substances against bedbugs, cockroaches, clothes moths, and carpet beetles.

U.S.Dept.Agric. Bull.707, 36 pp.

Twenty-seven different hydrocarbon-oil preparations, composed largely of oils of the nature of kerosene and gasoline mixed with varying amounts of nitrobenzene, phenols, essentials oils, etc., were tested. All these were ~~found~~ found to be effective on bedbugs. Kerosene was the only material effective on the bedbug eggs. The hydrocarbon-oil sprays undiluted, killed from 50 - 100 % of the cockroaches in treated cages. Flannels treated with oil emulsions at dilutions of 1-65 to 1-250 were not protected from infestation with the clothes moth. Kerosene vapors will kill the adult moths.

1490
1914. Scott, E.W. & Paine, J.H.

The lesser bud-moth.

U.S.D.A.Bul.113, 16 pp.

Soluble oil solution 1-15 had no effect on the bud moth larvae.

1491
1913. Scott, E. W. & Siegler, E.H.

Lime-sulphur as a stomach poison for insects.

U.S.D.A. Bur Ent. Bul. 116, Pt IV, pp 81-90

Where lime sulphur 1-50 and kerosene emulsion 10% were sprayed the total percentage of windfalls and picked fruit free from the codling moth was 90.18% as against 41.31% of fruit free on the unsprayed plat.

1492
1915. Scott, E.W. & Siegler, E.H.

Miscellaneous insecticide investigations.

U.S.D.A.Bul.278, 47 pp.

Kerosene emulsion at 10% strength was tried against the fall web worm without success. 10% kerosene and arsenate of lead was effective. Anthracene emulsion, 10%, alone and combined with arsenate of lead, burned the foliage badly. The 10% kerosene with the lead arsenate was an effective aphicide. There was some breaking down of the materials. Kerosene emulsion under 10% strength was not effective on *Aphis pomi*. Anthracene emulsion at 5% burned the foliage badly; at 3% it gave good control and did not injure the foliage.

1493
1917, Scott, R. J.

A farmer's remedy for the french bean fly
Queensland Agri. Jl. Vol. X, Pt. 1, p.9

A few days after planting the beans the rows are covered with a dressing of saw-dust. This layer is then dressed with kerosene emulsion. Then when the plants are in the second leaf a second kerosene emulsion dressing is made. The R. & H formula is given.

1494
1898. Scott, W. M.

Report of the entomologist.
Ann.Rept.Dept.Agr.Ga.for 1898, p.500-531.

Two applications of one part kerosene and three parts water, mechanically mixed, are recommended. This has been more effective than one application of pure kerosene and not as injurious to the peach trees. Kerosene emulsion diluted 1-12 has been used extensively but much injury resulted and scales were not entirely controlled. The mechanical mixture of kerosene and water is better.

1495
1899. Scott, W. M.

Kerosene treatment of San Jose scale.
Amer.Agriculturalist, Vol.63, No.3, 21st Jan.1899, p.74.

Kerosene treatment is the best for trees infested with the scale. A 25% mechanical mixture applied in the late fall will not injure the tree. A second application should be made in the spring just before the buds begin to swell, using a 15% mixture of kerosene and water.

1496
1899 - Scott, W. M.

Legislation against Crop Pests - Dangerous Pests Presented by the Board with Remedial Suggestions.
Georgia State Bd. Ent. Bul. 1, 32. pp.

Many orchards infested with San Jose scale were treated with kerosene and water mixture during the winter with excellent results. 20% and 25% oils were used. One should not use over 25% oil in the treatments because of danger of injury. Make at least two applications during the dormant period. For summer treatment no more than 15% kerosene should be used. The new peach scale may be controlled in the same way.

1497
1900. Scott, W. M.

Notes on coccidae of Georgia.

U.S.D.A.Div.Ent.Bul.26, n.s., pp.49-54.

A 20% kerosene water mixture was used successfully against the San Jose scale. 25% crude oil was more satisfactory than the kerosene.

Crude petroleum against San Jose Scale infesting peach and plum.

1498
Scott, W.M. and Fiske, W.F.
1902. Winter treatment of the San Jose scale in the light of recent experiments.

See Supplementary abstract

1499
1902 - Scott, W. M.

Instructions for the Treatment of San Jose Scale.
Gerogia State Bd. Ent. Bul. 5, 12. pp.

This paper is substantially a reproduction of the recommendations of Bul. 4. A summary of the important features of the tests show: That the petroleum oils constitute the most effective remedy for the San Jose scale, with the probable exception or lime, salt, and sulphur; that the advantage of crude oil over kerosene is only slight, and consists in its adhesive quality. That, owing to the unreliability of the mechanical mixing pump, emulsions are usually more satisfactory than mechanical mixtures. That, two applications, one in fall or early winter and the other in the spring are required to do effective work. That 20% oil is of sufficient strength. An emulsion of either crude petroleum or kerosene may be made as follows; 2 lbs. potash whale-oil soap; 4 gals. water; 8 gals. oil. Dissolve soap in water and boil, add the soap solution to the oil and pump the whole into itself for 10 min.

1500
1901- Scott, W. M.

Spring Treatment for Orchards Infested with San Jose Scale.
Georgia Sta. Bd. Ent. Circ. 5. 4 p.

The kerosene water mixture has given very good results using 20% oil as a winter treatment. The danger of injury to trees is least in late winter or spring. The mixture should be applied as a fine mist. As a summer treatment 10% kerosene is recommended. Crude petroleum can be substituted for the refined oil in the spring treatment. 25% was necessary to kill the scale. This is more effective against the scale than the same strength of kerosene. Crude petroleum can be recommended for peach and plum trees ~~only~~ in late winter and spring. The lighter paraffin oils are to be recommended in preference to the heavier oils.

1501
1902. Scott, W. M.

Some practical experiments with various insecticides for the San Jose Scale in Georgia.

U.S.D.A. Div. of Ent. Bul. 37, n.s.pp.41-51.

The following oils were used in experiments. (1) Pennsylvania crude, 43° gravity, (2) Refined kerosene 150° flash test, (3) Standard Oil Company's fuel oil, (4) California distillate.

Pennsylvania crude and refined kerosene were applied as mechanical mixtures at 15 & 20% oil strength and as soap emulsions at 15, 20 & 25 % oil strength. Considering the effect upon both the scales and treated trees, the results were slightly in favor of crude oil applied as a soap emulsion at 20 & 25% strengths. The same results were obtained with the refined kerosene. The fuel oil was applied at 10, 15 & 20 % strengths. The effect on the scale was as good as that obtained with the high grade oil. The trees suffered no apparent injury. The distillate emulsion was applied at the rate of 1 - 4. It was slightly injurious to the trees.

1502
1925 Seifriz. Wm.

Emulsions. I. Types of hydrocarbon-oil emulsions. J. Phys. Chem. 29, 587-95.

1503
1925 Seifriz, Wm.

Emulsions. II. Effect of electrolytes on petroleum-oil emulsions. J. Phys. Chem. 29, 595-600

1504
1925 Seifriz, Wm.

Emulsions. III. Double reversal of oil emulsions occasioned by the same electrolyte. IV. Multiple systems. V. The stabilization membrane. J. Phys. Chem. 29, 738-49.

Petroleum emulsions treated.

1505
1921. Sen, P. C.

The large brown cricket, Brachytrypes portentosus Lichet.

Bengal Agric.Jl., Dacca., Vol. I, No.4, pp.111-112.

The crickets are driven into their burrows and killed by pouring in kerosene and water. This makes them come out where they can be easily destroyed.

1506
1923. Sen, P. C.

Cotton leaf roller.

Bengal Agric.Jl., Vol.III, No.1, p.23, Dacca.

Rolled leaves containing the caterpillars should be put in a pot containing water and a little kerosene.

1507
1914. Sen, S. K.

Observations on respiration of culicidae.

Ind.Jour.Med.Research Vol.2, No.3, pp.681-697

The odor of the kerosene exerts a direct anaesthetic effect which may contribute to the larva's death.

1508
1919 - Severin, H.C.

15th Ann. Rept. of the State Entomologist of S.Dakota for the period ending 30th June, 1919.
S. Dakota State College; pp. 1-36.

The R & H formula for making kerosene emulsion is given. It is recommended for use on the European fruit tree lecanium at a dilution of 1-4 or 5; also for oyster shell scale and the Putnam scale. For currant aphis, a dilution of 1-7 may be used.

1509
~~1919 - Severin, H.C.~~
Currant and gooseberry worms.

Office of the State Entomologist of South Dakota, Circular 10, 6. pp.

The span worm of currant and gooseberry may be killed by dropping them in kerosene.

1510
1919 - Severin, H. C.
Currant and Gooseberry Lice.
Office of the State Entomologist of South Dakota Circular 11, 6 pp.

A dilution of 1 part of kerosene emulsion to 7 parts water may be used for the lice.

1511
1914. Severin, H. C. & H.H.P.

Relative attractiveness of vegetable, animal and petroleum oils for the Mediterranean fruit fly.
Jour.N.Y.Ent.Soc., Vol.22, No.3, pp.240-240.
Kerosene used as a bait proved better than gasoline, benzine or a distillate about 48°Be. Lubricating oil distillates were used with less success than kerosene. Crude petroleum was less effective. All the flies caught were males. About 3 females in a 1000 were caught.

1512
1912. Severin, H. H. P.

The introduction, methods of control, spread and migration of the Mediterranean fruit fly in the Hawaiian Islands.
Bul.Calif.Hort.Com., Vol.1, No.9, pp.558-565.
Besides kerosene, the following oils from crude petroleum were used in traps:
Naphtha distillate - Gasoline 86°; gasoline, 63°; Benzine 58°, Distillate, about 48°.
Burning oil distillate - Export oil 110°, star oil, 120°; mineral Seal; Colga Burning; Perfection Signal; Heavy burning oils.

Lubricating oil distillate - Renown engine oil, F.375, ~~lubricating~~ Atlantic Red F.350 (loom oil).
Naphtha or benzine captured more flies than gasoline. Kerosene captured more adults than Export oil and with the heavy burning oils, mineral Seal ranked first, 2nd, Colza Burning, 3rd, Perfection Signal. Very few fruit flies were attracted to the oils classed under lubricating oil distillate. Crude petroleum also attracted flies.

1513
1918. Severin, H. H. P.

Fruit flies of economic importance in California.

Mthly.Bull.Cal.State.Commiss.Hortic., Vol.VII, No.4, pp.201-206.

Kerosene emulsion sprayed on the ground did not destroy the larvae, pupae or adults upon emerging. The currant fruit fly was not attracted to petroleum oil in traps.

1514
1918. Severin, H.H.P.

Oils tested to trap Trypetidae and Ortalidae.

Mthly.Bull.Cal.State Commiss.Hortic., Vol.VII, No.6, pp.419-423.

Kerosene and petroleum oils had no attractant effect.

1515
Severin, Henry H.P. and Severin, Harry C.

A historical account on the use of kerosene to trap the Mediterranean fruit fly (Ceratitis capitata Wied.)
Jour. Econ. Ent. 6, No. 4, pp.347-351.
Pure kerosene oil used to capture the adults. An attractant and insecticide.

1516
1915. Severin, H.H.P.& Severin, H.C.

Kerosene traps as a means of checking up the effectiveness of a poisoned bait spray to control the Mediterranean fruit fly with a record of beneficial insects captured in the kerosene.

Jour.Econ.Ent.Vol.8,No.3,pp.329-338.

Ordinary kerosene (120°Bé) captured more fruit flies than any other oil. Kerosene traps were used to test the efficiency of the fruit fly spray, 10,239 flies were caught in five weeks before spraying and only 182 captured during and after spraying in five weeks.

1901 - Sherman, F.
1517 Orchards, insects, diseases and spraying.

Bull. N. Carolina State Bd. Agr. Vol. 22. No. 10. pp 9-24.

The R & H formula is given. Ivory soap is preferred in making the emulsion.

19[illegible] - Sherman, F.
1518 Orchard spraying.

N. Carolina Dept. Agric. Bul. [illegible] No. 6, 45 pp

The R & H formula for making kerosene emulsion is given. Laundry or soft soap may be used in its preparation.

1912 - Sherman, F.
1519 The San Jose scale. Orchard spraying. Orchard protection.

N. C. Dept. Agr. Bul. Vol. 33, No. 6, 59 pp.

Soluble oils are used in winter for San Jose scale at the rate of 1 gal to 10 gals. of water. The R & H formula for kerosene emulsion is given. The emulsion is troublesome to prepare and if used carelessly will injure the trees. For winter use on peach and plum 15% is strong enough. A 25% oil may be used on apple and pear in winter. This remedy only affects those insects that are actually wetted by it

1904 - Sherman, F. Jr.
1520 Preparation and use of kerosene emulsion.

N. C. Dept. Agr. Ent. Cir. 10, 6 pp.

The R & H formula is given with directions for preparing the emulsion. Tables for diluting the stock emulsion are included. The spray should be applied with a spray pump, in fair weather. Care must be used in applying the spray. It is ~~mxxd~~ used against scale insects and aphids.

1521
1914. Shipley, A. E.

Insects and War. Lice.

British Med.Journal,No.2803,Sept.19,1914, pp.497-499.

Kerosene will kill nits and lice in clothing.

1522
1914. Shipley, A. E.

Insects and war. The bedbug.

British Medical Journal,No.2804,pp.527-529; Sept.26.

A liberal application of kerosene or other petroleum oil in the cracks and crevices of a room will do much to destroy these insects.

1523
1900. Shutt, F. L.

The chemistry of insecticides.

Canada Expt.Farms.Rept.1899,pp.147-9.

The R & H formula is used, to which is added 2 pts.of crude carbolic acid for the oyster shell bark louse and borers. The carbolic acid is first dissolved in the kerosene before adding to the soap suds. This emulsion was also used for lice on cattle,hogs and hens.

Blue stone can not be added to kerosene emulsion. An immediate separation of the constituents results.

1524
190[illegible]. Shutt, F. T.

Chemistry of insecticides and fungicides.

Canada Expt.Farms Rpts.1905,pp.149-154.

The K-L emulsion of the Delaware Agr.Expt. Sta.is given. Kerosene emulsion can be made by adding flour 8 oz. to 1 quart and the mass thoroly stirred and water added at the rate of 2 gals. for every quart of kerosene. The flour emulsion was smooth, easily atomized and did not clog the nozzle.

1525
1907. Shutt, F. T.

New forms of kerosene emulsion.

Can.Hort.Vol.30,No.5,pp.109-110.

See Shutt.Can.Expt.Farms.Rept.for 1906.

1526
1907. Shutt, F.T.

Insecticides and fungicides.

Canada Expt.Farms Rpts.1906,pp.181-184.

The following formulae are given for winter washes: (1) Blue stone, 4 lbs.; flour,8 lbs.; kerosene,4 gals.; water, 36 gals.; (2) Caustic soda, 8 lbs.; flour, 8 lbs.; kerosene, 4 gals.; water, 36 gals.; (3) Same as No.2, except 4 lbs. of flour and caustic soda.

The following summer spray formulas are given: (1) Blue stone, 4 lbs.; lime, 4 lbs.; kerosene, 4 gals.; water, 36 gals. This is the usual Bordeaux mixture plus 10% kerosene. (2) This is the same as above except 4 lbs. of flour added.

1527
1908. Shutt, F. T.

Insecticides & fungicides.

Canada Expt.Farms Rpts.1907, pp.165-173.

Cooper's solution V2 has the following ingredients: Water, 18%; phenols, 29%; petroleum oils 20%; Saponifiable oils 25%; caustic soda 8%. The petroleum oil was kerosene. This spray is for summer use.

1528
1905. Shutt, F.T,and Macoun,W.T.

New forms of kerosene emulsion.

Country Gentleman,Vol.LXX,No,2735,June 29, 1905, p.608.

Prof.Close's work at the Delaware Expt.Station is reviewed for making K-L emulsion. Experiments were made showing that an equal amount of flour could be used in place of the lime for making kerosene emulsion. This work is reported from Ottawa Expt.Sta.

1529
1905. Shutt, F. T. & Macoun, W.T.

New forms of kerosene emulsion.

Can. Hort.Vol.28, No.5, p.165-167.

Kerosene and fresh slaked lime emulsion was made,and kerosene and flour emulsion following somewhat Professor Close's work in Delaware.

Lime,and flour emulsions are given p.210.

1530
1925. Siegler, E.H. and Popenoe, C.H.

The fatty acids as contact insecticides.

Jour. Econ. Ent. vol. 18, no. 2, pp. 292-293

Gasoline (benzol) used in emulsion as follows: Cocoanut fatty acids (double distilled) 200 cc. Gasoline (benzol) 200 cc; glue (granular) 100 g. water 525 cc.

1531
1920. Sigler, T. A.

Principal parasites of swine.

Am. J1.Vet.Med.,Vol.XV,No.4,pp.147-150.

Kerosene emulsion is applied usually to swine for lice.

1532
1896. Silvantyev, A.

The beet beetle and other enemies of sugar beets.

Selsk Khoz Lyesov, 183, pp.1185-1200.
E.S.R. Vol. 9, p. 256-7.

Kerosene alone or in combination with carbon bisulphide is entirely inefficient.

1533
1916. Simanton, F. L.

The terrapin scale; an important insect enemy of peach orchards.
U.S.Dept.Agric.Bull.351, 96 pp.

The oils used in the experiments were emulsified according to the following formula; oil, 2 gals; soap (hard) 1/2 lb; water, 1 gal.

Resin-oil emulsion was very effective on the terrapin scales but injured the trees severely. Corn oil was equally effective on the scales but penetrated deeply into the trees causing severe injury. Gasoline used as a 10% emulsion killed very few scales and caused no injury to the trees. This emulsion readily dissolved the waxy film which protects the scale from water and caused the scales to loosen temporarily from the bark.

Miscible oils were not satisfactory when applied against the terrapin scale in the winter season. Injury to the trees was noted when the oil was used in the winter, but no injury resulted when the oil was used between the swelling and bursting of the buds. A combination of gasoline emulsion and miscible oil was more effective than miscible oil alone. The greatest efficiency was obtained when 5 parts of miscible oil were mixed with 3 parts of gasoline emulsion and 92 parts water. The addition of nicotine did not increase the effectiveness of miscible oil.

-2-

Simanton, D.B. 351, continued.

Cottonseed oil, emulsified, was effective against the scale but caused severe injury to the trees. The effectiveness of this emulsion was increased by the addition of gasoline.

Linseed oil was very promising when used alone as a 10% emulsion, but it gave better results combined with gasoline. The following formula for making the linseed gasoline emulsion is given. Raw linseed oil, 5 gals; gasoline, 3 gals; soap, 2 lbs; water, 92 gals. This should be sprayed in the spring during the period between the swelling and opening of the buds.

1534

Simmonetto, Moises
1922. Insecticidal emulsions and physico-chemical factors which concur in theri effectiveness.
Revista de Agric. Comercio y Tralajo, ~~XXXXX~~ Cuba Ano 5, No. 2, Vol. 5, Apr. 1922 pp.5-8

See Supplementary abstract

1535
1903. Simpson, C. B.

The control of the codling moth.

U.S.D.A.Farmers' Bul.171, 24 pp.

Kerosene emulsion applied frequently was found effective against the codling moth. On account of the expense and necessity of frequent application it has never been used to a great extent.

1536
1903. Simpson, C. B.

The yellow-winged locust.

U.S.D.A.Div.Ent.Circ.53, 3 pp.

Crude petroleum is sprayed over the breeding grounds upon the young locusts, which are killed by contact with the oil.

1537
1896. Sirrine, F. A.

Notes on remedies for the pernicious and other scale insects.
N.Y.(Geneva)Agr.Expt.Sta.Rept.1895, pp.605-617.

Kerosene emulsion diluted 1-2 and 1-3 was used on 1 yr.old nursery stock. The stock was injured to such an extent that it had to be cut back. In 3 & 4 year old apple trees sprayed with kerosene emulsion 1-3, fully 90 % of the scale was killed. This was a late winter treatment. Kerosene emulsion 1-10 and crude petroleum emulsion 1-12, 1-10 and 1-11 were applied as summer washes. The crude petroleum emulsion defoliated the trees, but the scale crawlers and partially protected young were killed. The kerosene did not defoliate the trees, but the scales partially protected were not killed.

1538
1897 - Sirrine, F.A.

A practical method of fighting cutworms in onion fields.
N.Y. Agric. Expt. Sta. Bul. 12?; pp. 183-190.

Kerosene emulsion was sprayed on rows of onions among which cutworms were abundant. The application was made at night. The emulsion was diluted 1-8. The cutworms were feeding on the tops at time of spraying. The worms fell to ground when hit but no cutworms were found dead in the morning.

1539
1902 - Sirrine, F.A.

Treatment for San Jose Scale in Orchards.
II: Spraying with Kerosene and Crude Petroleum.
N.Y.Agr.Expt.Sta. Bul. 213; pp. 25-51.

Only the best grades can be used, as the lower grades are liable to injure the trees. Tests were made with 100° flash test (distillate) and 150° flash test (water white). Mechanical mixtures ranging from 15 to 25% can be used on apple and pear while the trees are in full leaf with but slight injury. However mixtures of lower strength caused injury to stone fruits under the same conditions. Such dilute mixtures were of value only against young insects unprotected by scales. Tests with crude petroleum having a Sp. gr. of 35° Be and 43½ °Be were made. Spring tests showed that the 35°Be petroleum cannot be used safely on either apple, peach or pear. Peach and plum can be sprayed quite safely with a 25% mechanical mixture of crude petroleum 43½ °Be, after the buds begin to swell. When dormant trees were sprayed they were generally injured. Pear and apple trees treated after the buds commenced to swell were injured to some extent. A 50% mixture may be used on pear and apple while dormant. Scale insects, when fully exposed were not all killed by the 15% strength of crude petroleum. Two applications of 15% were effective or one application of 25%.

1540
1918. Skaife, S. H.

Pea and Bean Weevils.

Union of S. Africa Dept.Agric.Bull.12, 32 pp.

Beans infested with weevil were soaked in kerosene for 1 hr. All the weevils were killed, and the beans germinated (93%) when planted.

1541
1892. Slingerland, M. V.

The pear-tree psylla.

Insect Life, Vol.V, No.2, pp.100-104.

The eggs of the psylla could not be destroyed by kerosene emulsion. A 2% kerosene emulsion was very effective on the nymphs.

1542
1892 - Slingerland, M.V.

The Pear tree Psylla.
N.Y.Cornell Univ.Agr.Expt.Sta.Bul. 44, p. 161-186

The R & H formula for kerosene emulsion is given. Laboratory and field work with this emulsion diluted with 25 parts of water (less than 3% kerosene) was so successful that no other insecticides were tried. The spray was applied against the nymphs.

1543
1893 - Slingerland, M.V.

The four-lined leaf-bug.
N.Y.Cornell Univ.Agr.Expt.Sta.Bul 58, pp. 207-239.

The R & H formula for kerosene emulsion is given. The best time to apply it is before the insect reaches the adult stage. The emulsion is diluted not more than five times and applied not later than the last week in May.

1544
1893 - Slingerland, M.V.

The pear leaf blister. ?
N.Y. Cornell Univ. Agr.Expt Sta.Bul. 61, pp. 317-328.

Trees sprayed in March with kerosene emulsion diluted 1-3 or 10, were practically freed of the blister mites. The spray was most effective when diluted with not more than 8 parts water or about 8% kerosene.

1545
1897. Slingerland, M. V.

The Cornell mixture.
Science, Vol.22, No.551, p.105-6.
The Cornell mixture was Paris green, Bordeaux mixture and kerosene emulsion. The kerosene emulsion was made by the R & H formula. The mixture was hard to make and did not spread readily.

1894 - Slingerland, M.V.
1546 The cabbage root maggot with notes on the onion maggot and allied insects.
N...Cornell Univ.Sta.Bul. 78, pp. 481-577.

Results showed kerosene emulsion (made by the R.&H formula) diluted with 12 parts water, to be quite effective if applied early and often to radishes and onions, and two or three times on cabbages and cauliflower.

1894 - Slingerland, M.V.
1547 A plum scale in Western New York.
N.Y. Cornell Univ.Agric.Expt.Sta.Bul. 83, pp.681-699

Kerosene emulsion diluted 4 times is the most effective remedy for the plum scale, when sprayed between Nov. and April, but every scale must be hit. When the young scales are crawling, they may be destroyed by the emulsion diluted 6 or 8 times.

1548
1895. Slingerland, M. V.

The plum-twig gall mite.

Canadian Ent., Vol.27, No.12,pp.329-333.

Kerosene emulsion made by the R & H formula may be tried on trees during the dormant period. It is doubtful if it will penetrate the galls.

1549
1895 - Slingerland, M.V.
The Cigar case-bearer.
N.Y.Cornell Univ.Agr.Expt. Sta.Bul. 93; pp.215-230

Experiments in Canada showed that kerosene emulsion dilute 1-9 will effectively check the case bearer.

1550
1896 - Slingerland, M.V.
Wireworms and the bud moth.
N.Y.Cornell Univ.Agr. Expt.Sta.Bul.107-pp. 37-60.

Kerosene, pure and as an emulsion will kill the wireworms if applied in sufficient quantities, but this would destroy all vegetation. Results with crude petroleum and crude petroleum emulsion were not so good as those with kerosene .

1551
1896 - Slingerland, M.V.
The pear psylla and the N.Y. Plum scale.
N.Y.Cornell Univ.Agr.Expt Sta.Bul. 108; pp.69-86

The nymphs of the pear psylla can be checked effectively by spraying with kerosene emuls on diluted 1-15. This dilution will also kill some adults. A dilute kerosene emulsion (5% oil) is better for hibernating adults .Kerosene emulsion diluted with 4 parts of water gave very good results on the plum scale when sprayed once in the autumn after the leaves fall and at least twice in the spring before the buds open. Each scale must be hit.

1552
1896. Slingerland, M.V.

Winter work among insects injurious to fruits.

Garden & Forest,Vol.9, No.413,Jany.22,1896,p.36.

The adults of pear psylla in hibernation in sheltered places in the bark can be killed with kerosene emulsion.

1553
1897 - Slingerland, M.V.
The Pistol Case bearer in Western NY.
N.Y.Cornell Univ.Agr.Expt.Sta.Bull.124, 17 pp.

Kerosene emulsion was tried when the insects were feeding but no effect was noted.

1554
1898 - Slingerland, M.V.
The grape vine flea beetle,

N.Y.Cornell Univ. Agr.Expt.Sta.Bul. 157-pp.189-213

The fleabeetle may be collected in pans containing kerosene or on sheets soaked in kerosene.

1555
1898. Slingerland, M. V.

Mixing kerosene emulsion and Bordeaux mixture.
Rural New Yorker,Vol.LVII,No.2519,May 7,1898, p.336.
Kerosene emulsion made by the R & H formula can be combined with Bordeaux mixture only when the Bordeaux is neutral. The combination does not spread as well as the emulsion or Bordeaux used separately.

1556
1899. Slingerland, M. V.

Peach borer, kerosene and water.

Rural New Yorker,Vol.58,No.2565, 25 Mar.1899, p.227.
Kerosene and water can be emulsified by means of an especially constructed pump. The kerosene and water remain mixed for a time sufficient for application.

1557
1900. Slingerland, M. V.

Crude petroleum for the San Jose scale.

Rural New Yorker, 59, No.2649,p.732.

Crude petroleum applied as a 25% mechanical mixture was very effective in controlling the scale in the hands of some orchardists and in others was not effective. This was due to their method of application.

1558
1900. Slingerland, M. V.

Tar and kerosene for trees.

Rural New Yorker,Vol.LIX,No.2652,24 Nov. 1900, p.784.

Theoretically a mixture of pine tar and kerosene would kill fruit trees whenever applied. The mixture will undoubtedly kill the scale.

1559
1901 - Slingerland, M.V.
Three Unusual Strawberry Pests and a greenhouse pest.
N.Y. Cornell Univ.Agr.Expt Sta.Bul. 190, pp. 143-164

A light trap with a film of kerosene on the water is recommended for ground beetles feeding on strawberries and the greenhouse leaf-tyer. A spray of kerosene emulsion or kerowater mixture (10% kerosene) will kill all the nymphs of the white fly hit.

1560
1903 - Slingerland, M.V. & Fletcher, P.S.
The ribbed cocoon maker of the apple
N.Y.Cornell Univ.Agr. Expt. Bul. 214, pp. 69-78.

This insect may be controlled by killing the hibernating pupae, with a 35% kerosene and water mixture.

1561
1904 - Slingerland, M.V.
The Grape leafhopper.
N.Y. Cornell Univ.Agr.Expt.Sta.Bul. 215, pp.82-102

A mechanical mixture of crude petroleum (15-40% oil) was not so satisfactory as the kerosene water mixture (15-20% oil) which kill the adults when hit. Grape foliage was injured by a mechanical mixture containing 10% kerosene. A 5% kerosene mixture was used to knock the adults on the ground; this was follwed by a 25% mixture to kill them on the ground, Considerable foliage injury resulted. Standard kerosene emulsion (15% oil) killed few adults but the nymphs were quickly killed when hit by it. The oil-water pumps were found to be unreliable.

1562
1904. Slingerland, M. V.

Kerosene in Bordeaux mixture.
Rural New Yorker,Vol.LXIII,No.2821,p.132.
It is claimed that the smell of kerosene oil in Bordeaux mixture will drive the rose bugs from grapes. Slingerland believes the Bordeaux mixture is just as effective without the oil.

1563
1904. Slingerland, M. V.

Making a kerosene emulsion.

Rural New Yorker,Vol.LXIII,No.2831,p.364.

The R & H formula is given.

1564
1904. Slingerland, M. V.

Some serious insect depredations in New York in 1903.
U.S.D.A.Bur.Ent.Bul.46 pp.69-73.

Kerosene emulsion diluted 1-7 to 10 or oil and water spray of 10 to 15% oil will control the pear psylla.
Also(p.75) agaonst the Grape Leaf Hopper (Adults) on grape.

1905? Slingerland, M.V.
1565

U.S.Dept.Agr. Div.Ent. Bul. 52, n.s., p.47

Kerosene emulsion against Leaf-hopper infesting grape.

1566
1908 - Slingerland, M.V., & Crosby, C.R.
Insect pests and Plant Diseases.
III. Insecticides.
N.Y. Cornell Univ.Agr. Expt.Sta.Bul. 252, pp.346-349

The R & H formula for kerosene emulsion using hard or whale oil soap is given. For dormant trees the emulsion should be diluted 1-5 or 7, For plant lice on foliage dilute 1-10 to 15. Crude oil may be substituted for the kerosene. Miscible oils are on the market primarily for use against San Jose scale. They are easily applied and generally effective. They should be used only on dormant trees.

1567
1910 - Slingerland, M.V., & Herrick, G.W., & Crosby, C.R.

The control of insect pests and plant diseases.
II Insecticides.

N. Y.Cornell Agric.Expt.Sta.Bul. 283; pp. 476-478

See Bul. 252 of this station.Kerosene emulsion formula and miscible oils.

1568
1908. Smith, H. S.

Aphids injurious in Nebraska during 1906-7.
Nebr.Bd.Agr.Rept.for 1908,pp.307-326.
The R & H formula for kerosene emulsion is given. Before applying to plants it should be diluted with water to form from 5% to 40% kerosene, according to season and plant.

1569
1909 - Smith, Harry S.
The Boxelder Aphis.
Nebr. State Ent. Circ. 1, 4 pp.
Kerosene emulsion is recommended for the control of the boxelder aphis. It is made by placing 1 lb. of a common soap in 1 gal. water and boiling until thoroly dissolved. Then remove from the fire and add 2 gals. kerosene; agitate the emulsion vigorously for a few minutes by running it thru a spray pump. Before applying the spray it should be diluted so as to contain for 5 to 7% kerosene. By spraying with a 33-1.3% kerosene emulsion in the early spring before the leaves appear the eggs of the aphid may be destroyed.

1570
1922. Smith, H. S.

Report of the bureau of pest control,1922.

Mthly.Bull.Cal.Dept.Agr. Vol.XI, No.11-12, pp. 793-838.

No peach borers survived when the trees were submerged in miscible oil diluted 1-12, the air being exhausted to a 27-inch mercurial vacuum.

1571
1889. Smith, J. B.

Spraying for the elm leaf-beetle.

Insect Life, Vol. II, No. 1, p. 29.

1 pt. of kerosene emulsion to 20 gals. of water containing 1/5 lb. of London purple is recommended.

1572
1890 - Smith, J. B.

Report of Entomologist.
New Jersey Stations, Annual Report 1889, pp. 241-313.

Kerosene emulsion is made by forming a suds of ½ lb. soap and 1 gal. water and adding boiling hot to 2 gals. of kerosene. Churn the mixture violently for 10 minutes by means of a force pump. A dilution of 1-12 is effective against almost all except scale insects. 1-15 is effective against all soft bodied larvae. Its advantage is in its penetrating quality and killing wherever it touches.

1573
1890. Smith, J. B.

The insects injuriously affecting cranberries.

N.J.Agr.Expt.Sta.Spec.Bull.K, 43 pp.

Kerosene emulsion was found fairly effective against the larval and egg stages of the yellow-headed cranberry worm. A 1-12 dilution is recommended for the egg stage. The formula for the emulsion was: Kerosene, 1 gal; water, 2 gals; soap, 1/2 lb.

1574
1890 Smith, J.B.
Note on the Wheat Louse.
New Jersey Agr. Expt.Sta. Bul. 67, 2 pp.
Where the wheat is badly infested and not too far advanced, one thoro spraying with kerosene emulsion is advisable. Make a suds of ½ lb. soap and 1 gal. of water and pour boiling hot into 2 gals. of kerosene. Churn with a force pump for 10 minutes. Dilute this emulsion when cold with 15 parts water and spray thoroly.

1575
1890 - Smith, J. B.

Plant Lice and how to deal with them.
New Jersey Agr.Coll. Exp. Sta. Bul. 72, 27 pp.

Kerosene emulsion is recommended for the wheat louse. The emulsion is made as given in Bul. 67 of this station.

1576
1890 - Smith, J.B.
Insecticides and how to apply them.
New Jersey Agr. Coll.Ext.Sta. Bul. 75, 34 pp.
Kerosene emulsion formula is given as in Bul. 67 of this station. It was effective against all plant lice when diluted 1-12 and effective against all save the blackish species when diluted 1-15. It killed all kinds of scale insects diluted 1-12. Sludge oil soap was tried on the rose chafer with success. It readily killed the striped cucumber beetle and the elm leaf beetle, but was not effective against the cottony maple scale. The material is much more effective and penetrates better when slightly warm.

1577
1890. Smith, J.B.

An experience with rose bugs.

Insect Life, Vol.III, No.3, p.114.

Kerosene emulsion was useless against these

1578
1891. Smith, J. B.

An experience with the rose bug.

Insect Life, Vol.3, No.5, p.220-4.

Kerosene emulsion tended to drive the rose bugs away, and in some cases killed them.

1579
1891. Smith, J.B.

Notes of the year in New Jersey.

Insect Life, Vol.IV, No.1 & 2, pp.43-45.

Kerosene emulsion 1-12 was a failure for plum curculio.
Kerosene emulsion (p.33) & pyrethrum was used against the Rose Chafer.

1580
1891 - Smith, J. B.
The Rose Chafer.
New Jersey Agr. Coll. Expt. Sta. Bul. 82, 40 pp.

Kerosene emulsion was not effective against the rose chafer. A pyrethro-kerosene emulsion was tried diluted 1-6, 1-9 and then at 1-10 but with no effect on the beetles.

1581
1891 - Smith, J. B.
Two Strawberry Pests.
New Jersey Agr. Expt.Sta. Bul. 149, 17 pp.
Plants may be cleaned by dipping in kerosene emulsion diluted 1-12. Heat 1 lb. Ivory or ½ lb. whale oil soap in 1 gal. of water. Pour this into 2 gals. of kerosene and with a pump churn for a few minutes. This is ready to dilute when needed. It is better to add water gradually at first to dissolve the emulsion and then fill up to the full amount.

1582
1892. Smith, J. B.

Notes of the year in New Jersey.

Insect Life, Vol. V, No. 2, p. 93-98.

Kerosene emulsion was ineffective against the rose chafers.

1583
1892 - Smith, J. B.

Report of the Entomologist of New Jersey Stations.

New Jersey Agr. Exp. Stas. Annual Report for 1891, pp 341-426.

Kerosene emulsion was tried on the eggs of the squash borer, but the kerosene would not penetrate the hard shell, even when the mixture was directly applied. Kerosene emulsion 1-12 was an entire failure for plum curculio.

1584
1892 - Smith, J. B. & Halsted, Byron, D.

Spraying for Insect and Fungous Pests of the Orchard and Vineyard.
New Jersey Agr. Coll. Expt. Sta. Bul. 86, 20 pp.

Kerosene emulsion is recommended for plant lice. Make a suds of ½ lb. of hard soap and 1 gal. of water and pour boiling hot into 2 gals. of kerosene. Churn with a force pump until completely emulsified. Dilute 1-12. This will kill almost everything in the form of plant lice. Dilute 1-15 for peach lice.

1585
1893 - Smith, J.B.

Report of the Entomologist of New Jersey Stations.
N. J. Stas. Annual Report for 1892, pp. 387-512.

Plant lice will develop enormously and will cause serious damage to apple, pear, plum, peach, cherry and other trees. Kerosene emulsion is the best remedy for them. It is made by dissolving ½ lb. hard soap in 1 gal. of water and pouring boiling hot into 2 gals. of kerosene. Churn with a force pump until completely emulsified. Dilute 1-12. This spray will kill almost all plant lice. Dilute 1-15 for peach plant lice. Kerosene emulsion was tried on Rose chafer as reported in Bul. 82. Kerosene emulsion for melon louse is described in Bul. 86 of this station.

1586
1893 - Smith, J.B.

Insects Injurious to Cucurbs.
New Jersey Agr. Coll. Exp. Sta. Bul. 94, 40 pp.

When the melon louse has begun to spread, the plants should be sprayed with kerosene emulsion, made as described in Bul. 86 of this station and diluted with from 12 to 15 parts of water.

1587
1894. Smith, J. B.

Introduced insects.

Ent. News, Vol. 5, No. 10, pp. 311-312.

Before setting out a tree the trunk and larger limbs should be washed with kerosene emulsion, diluted by no more than five parts of water.

1588
1894. Smith, J.B.

The San Jose scale in New Jersey.

Insect Life, Vol. VII, No. 2, pp. 163-7.

Kerosene emulsion 1-9 was used successfully in one case on the mature scales just before the young larvae emerged. Diluted 1-11 to 15 it proved ineffective on half grown scales. Diluted not more than 5 times, it proved effective against all scales on the trunks of trees.

(p.213) Kerosene against mosquito larvae.

1589
1894 - Smith, J.B.

Report of the Entomologist, N. J. Agric. Expt. Stas. Ann. Rept. 1893, pp. 437 - 603.

If pear tree psylla is noticed on the buds or young leaves the trees should be treated to a liberal application of kerosene emulsion diluted 1-15.

1590
1894 - Smith, J.B.

The San Jose Scale in New Jersey.
New Jersey Agr. Coll. Expt. Sta. Bul. 106, 24 pp.

As a penetrating material nothing is better than kerosene for the San Jose scale. It may be applied pure to dormant trees. It is more effective when emulsified with soap suds and diluted. Dissolve ½ lb. hard soap in 1 gal. boiling water, add 2 gals. of kerosene and churn with a force pump. The hotter the liquids are when they are joined the sooner the emulsion will be formed. For this scale dilute 1-5 and apply liberally. The kerosene does not evaporate as readily and more opportunity is given to penetrate the scale.

The causticity of the soap is also of use in loosening the scale and facilitating the entrance of the oil. The water should be soft for best results.

1591
1895. Smith, J. B.

Report of the entomologist.

New Jersey Agr. Expt. Sta. Rept. 1894, pp. 421-600.

Kerosene emulsion was recommended for the cottony maple scale; a dilute mixture will penetrate the cottony or waxy mass readily and will kill the adult female and all the young larvae.

1592
1895 - Smith, J.B.

"Raupenleim" and "Dendrolene".
New Jersey Agric. Coll. Expt. Sta. Bul. 111, 11 pp

Raupenlein and Dendrolene are both crude petroleum products, the former probably with some admixture of a substance resembling coal tar in color and odor, but in both cases the base seems to be a very crude and impure vaseline. Used principally for banding trees.

1593
1896. Smith, J.B.

Department of economic entomology.

Ent. News, Vol. VII, No. 1, p. 10-13.

The scale may be killed by spraying kerosene over the tree and then setting fire to it. The tree was apparently uninjured by the method.

1594
1896 - Smith, J. B.

The Pernicious or San Jose scale.
New Jersey Agr. Expt. Sta. Bul. 116, 15 pp.

Pure kerosene is fatal to the San Jose scale, but seems to be so to trees as well. It is not recommended especially on young trees; but in a badly infested orchard a few trees may be sprayed as an experiment.

1595
1897 - Smith, J. B.

Report of the Entomological Department of the New Jersey Agricultural College Experiment Station for 1896. Ann. Rept. N.J. Expt. Stas. for 1896. p. 431-563.

Kerosene, when it is possible to bring it in contact with an insect, kills promptly even when considerably diluted. It possesses great penetrating power. Used pure, it kills the San Jose scale but in most cases,

1596
1897. Smith, J. B.

The influence of environment on the life history of insects.

Garden and Forest, Vol. 10, No. 496, Aug. 25, 1897, p. 334.

Insects which succumb readily to kerosene in the Atlantic States, defy it absolutely in Colorado.

1597
1897 - Smith, J. B.

The Harlequin Cabbage Bug and the Melon Plant Louse.
New Jersey Agr. Expt. Sta. Bul. 121, 14 pp.

The harlequin cabbage bug may be killed by collecting them early in the day in pans in which there is a scum of kerosene. Kerosene emulsion diluted ten times is recommended for the melon plant louse.

1598
1897 - Smith, J. B.

The San Jose Scale and How it May be Controll ed
New Jersey Agr. Expt. Stas. Bul. 125, 16 pp

Kerosene as an insecticide has been used for many years either as an emulsion, diluted with water or in a mechanical mixture. With proper care and attention oil can be safely used on fruit trees, dormant or active, and will kill all the scales with which it comes in contact. The essential points to be regarded in the application of kerosene are the finest possible spray, the completest and thinnest possible coating over the entire surface and weather conditions favoring rapid evapporation. The trees must be dry.

1599
1898 - Smith, J.B.

Report of the Entomological Department of the N. J. Agr. Coll. Expt. Sta. for 1897.
Ann. Rept. N.J. Agric. Expt. Sta. for 1897, 395-492.

The Riley-Hubbard formula for making kerosene emulsion is given also Prof. Goff's idea for making a mechanical mixture of kerosene and water and Prof. Weed's mechanism for spraying the mixture in reliable proportions. Experiments were made to determine the effect of undiluted kerosene on plants and the circumstances under which it could be safely used. It was found that kerosene must be applied in a fine spray, so as to cover quickly and thoroly.

A thin film covering everything ~~is all that~~ is needed. It must not be put on in damp or heavy weather. A bright dry day when a light wind is stirring is recommended. An oil of 150° is better than one of 110° Test. Dendrolene was used in experiments which was covered in Bul. 111.

1600
1898? Smith, J.P.

U.S.Dept.Agr. Div.Ent. Bul. 17, n.s., p.51

Kerosene against San Jose Scale on pear and peach.

1601
1899 - Smith, J. B.

Report of the Entomologist.
N. J. Agr. Expt. Sta. Ann. Rpt. for 1898, pp. 373 - 467.

Kerosene was tried out on scale with no more satisfactory results than had been reported in previous reports and bulletins. Crude oil to destroy scale was suggested by Mr. Lafayette T. Schanck, on the basis of his experience in its use on cattle and on garden plants. Experiments were made but insufficient data will preclude final conclusions. A record of the experimental orchard is given (See abstract of Bul. 155 of this station). Crude petroleum is discussed (See also abstract of Circ. 22, of the N. J. State Bd. Agr). The kerosene experiments are abstracted in the N. J. State Bd. Agr. Entom. Circ. 3. Kerosene and rosin mixtures were tried. There was no injury to the leaf buds but none of the fruit buds set in any of the experiments. Practically all the scale were killed.

1602
1899 - Smith, J.B.

Crude Petroleum as an Insecticide.
N. J. Agric. Expt. Stas. Bul.138; 22 pp.

Experiments tend to prove that crude petroleum is an important insecticide for winter application on orchard trees. It was fully as effective against scale insects as kerosene, and was harmless to the most tender varieties and to the youngest trees. The oil remained on the trees whether put on undiluted or mixed with water. A Vermorel nozzle should be used if put on undiluted. It is just as well to use an emulsion sprayer and mix with 60 to 75% water. A gallon of emulsion containing 25% oil gave a better coating than 1 qt. of oil undiluted. On trunks and branches a summer application is as safe as if made in winter and small trees or larger ones not generally infested can be summer treated if application to the foliage is avoided. Since Jan. 1898, nearly 4000 trees of the ordinary orchard fruits, other than cherry were treated with crude petroleum, either undiluted or mixed with 60 to 75% water. The trees varied from stock just out of the nursery to old trees in full bearing. Not a single case of injury to any tree treated in the winter was observed. In a number of cases the oil seemed to act as a stimulant and the sprayed trees showed greater vigor and better foliage than those untreated.

1603
1899 - Smith, J. B.

Three common orchard scales.
New Jersey Agr. Expt.Sta. Bul. 140, 16 pp.

To penetrate beneath the scales nothing is better than kerosene when freely used and thoroly applied. Crude petroleum is mentioned and results given are the same as in Bul. 138 of this station.

1604
1900 - Smith, J.B.

Report of the Entomologist.
N. J. Agr.Expt.Stas. Ann.Rpt. 1899; pp.421-512;

Kerosene is reported to have shown injury and in other cases no injury but it is known to be an efficient insecticide when intelligently employed. Crude petroleum is referred to and details are given in Bul; 138. The regular method of making kerosene emulsion is again given.

1605
~~1900 - Smith, J.B.~~

The Apple Plant Louse.
New Jersey Agr.Expt.Sta. Bul. 143; 23 pp.

Kerosene emulsion 1-12 or a 5% kerosene in a mechanical mixture will materially lessen the number of plant lice.

1606
1900 - Smith, J. B.

Crude Petroleum vs. the San Jose or Pernicious Scale.
N. J. Agric. Expt. Stas. Bul. 146; 20 pp.

Reference is made to the use of crude petroleum in Bul. 138. Some statements as to injury are modified. The cases of injury reported were from people who did not observe the necessary precautions. A trip to the oil fields of Penna. and W. Va. is described in some detail. The specific gravity of many oils ranged from 38° to 54°. The oils with Sp. gr. of less than 42° were dangerous to use on trees while oils above this could be used with a degree of certainty from injury. When crude petroleum is sprayed on a scaly tree, the light oil penetrated at once under and thru the scale, coming thus into direct contact with the insect beneath it. To be effective, enough oil must be applied to soak all the scaly surface, but no more is needed. The tree must be dry. The light oil soon disappears, leaving a film of heavy mineral fat - the vaseline or paraffin. This film is very thin but very persistent , remaining visible for months, shedding water, preventing the set of scale larvae and perhaps extensive loss of moisture from the surface. Methods of applying the crude petroleum are given either as undiluted or in a mechanical mixture with water. Oil is useful as a winter application only. The fact that it makes a good winter spray makes it dangerous in summer. The vaseline residue clogs the breathing pores of the foliage or soaks into the tissue and kills it.

1607
1900 - Smith, J.B.

Kerosene as an insecticide.
N.J. State Bd.Agric.Entom. Circ. 3; 3 pp.

Kerosene is fatal to almost all kinds of insect life and carelessly used is almost as fatal to plants. When applying undiluted kerosene, the day must be dry and clear, the tree must be dry and the kerosene applied in a fine, mist-like spray and no more than enough to wet all parts. Peach trees less than 3 yrs old should not be winter treated with kerosene. Weak or sickly trees are apt to be injured by either winter or summer treatment. The best time to apply undiluted kerosene is just before the buds begin to swell or after the fruit has become well set. Kerosene undiluted need be applied only in rare cases of serious infestation by very resistant scales, or when a bad attack of aphids threatens the life of a tree. Kerosene does not mix readily with water, but it can be made soluble by first making an emulsion with soap. Preapred as follows: Dissolve ½ lb. hard soap in 1 gal. boiling water, warm 2 gals. kerosene and pour the boiling suds into it. Churn violently by pumping thru a force pump. Diluted 15 times it kills plant lice, the young of many leaf hoppers and numerous other soft bodied unprotected species. Diluted ten times, it kills almost all plant lice, young of most other bugs, almost all scale larvae and majority of all other insects that can be reached with a contact poison. Diluted 5 times it kills all but adult scale insects and reaches the limit of its effectiveness. The emulsion is often more injurious to plants than undiluted kerosene. A mechanical mixture of kerosene & water may be applied by means of a Deming emulsion sprayer or other similar machine. 1 part kerosene to 10 parts water is a good general proportion and most soft bodied insects while causing no injury to foliage. 1-5 will kill all plant lice, all leafhoppers, the pear psylla and the larvae and young of most scale insects. This is a good application for S.J. scale and does not harm foliage. it is less apt to cause unjury than the kerosene emulsion & requires no troublesome preparation. Kerosene on trees of almost any kinds must be carefully used.

1608
1901? - Smith, J. B.

Crude Oil as an Insecticide.
N. J. State Bd. Agr. Entom. Circ. 22, 3 pp.

Crude petroleum was tested during the season of 1898-99 and was recommended for the winter treatments of scale infested trees in preference to kerosene or other oil mixtures. It was harmless to all ordinary orchard trees. It is not adapted for use in summer or on growing foliage at any time, because of its choking effect. The lighter part evaporates and leaves a thin film of greasy material which closes the breathing pores of the leaves. The bark of the trunk and branches may be completely covered at any period without injury to the tree. Against San Jose scale its effectiveness was complete; it killed wherever it touched and when put on in sufficient amount, it penetrated through even dense masses of insects. The sediment left after the more volatile materials have gone off is advantageous, because no young or larval scale can set through it safely. It is recommended for winter use against San Jose toward the end of Feb. The application should be made when the tree is dry. The crude petroleum may be applied as a mechanical mixture with water by means of a pump used for kerosene mixtures. Every scale must be hit with a drop of oil. Crude petrolum is recommended only for winter application, on San Jose scale.

1609
1901 - Smith, J. B.

Report of the Entomological Department for 1900.
Ann. Rept. New Jersey, Agr.Expt.Sta. for 1900. p.477-572

Crude petroleum as an insecticide (see abstract of Bul. 146.). A summary of winter applications and effects of crude oil soap (1 lb. to 6 qts. water) crude petroleum undiluted (Sp. gr. 43°) and fuel oil (Sp. gr. 35°) on the experimental orchard are given.

1610
1902 - Smith, J. B.

Report of the Entomological Department for 1901.
Ann.Rept. N. J. Agr. Expt.Sta. for 1901, p. 461-587.

Crude oil is the chief reliance for fighting the San Jose scale in N. J. Observations are given of work with crude oil. Some are good and some bad. If crude oil is used undiluted, a high grade oil and intelligent care are necessary in making the application. If in a mechanical mixture, a lower grade oil may be used and 20% will be sufficient. The oil pump must be watched to get results. The ideal time for spraying is just when the sap begins to rise.

1611
1902 - Smith, J. B.

The Entomologists Experiment Orchard.
N. J. Agric. Expt. Sta. Bul. 155, 71 pp.

See Supplementary abstract

1612
1902 - Smith, J. B.

The Rose Scale.
New Jersey Agr. Expt. Sta. Bul. 159; 14 pp.

When a very heavy infestation is present a 10% mechanical mixture of kerosene of crude oil and water may be used with advantage.

1613
1902 - Smith, J. B.

The Salt Marsh Mosquito.
New Jersey Agr. Expt. Sta. Spec. Bul. T, 10 pp.

For a small pool, almost evaporated, swarming with larvae and pupae, a pail of fuel oil, kerosene or crude petroleum and a broom are needed. Dip the broom into the oil pail, shake the oil over the pool and then sweep over the surface thoroly to get the oil into the grass and along the banks so that every part of the pool may be coated with oil. In less than an

1614
1902 - Smith, J.B.

Treatment for San Jose scale in orchard and nursery.
Penn. Dept. Agr. Bul. 90. 33. pp.

See Supplementary abstract

1615
1903 - Smith, J.B.

Report of the Entomological Department.
N.J.Agr.Expt Sta.Ann.Rpt.for 1902; pp 425-593.

No specific experiments were made with crude petroleum. Its range and method of its application have been again and again repeated, and despite some bad results, its use has been steadily extended. The material is now really in the hands of the fruit growers and their experience must decide its range and usefulness. Undiluted crude petroleum of the proper character (43° Be or higher) is preferable to any other material. The use of the undiluted petroleum is limited, due to plant injury and methods of application. There is a tendency to use emulsions or mechanical mixtures containing 20 to 25 % oil.

1616
1903 - Smith, J. B.

Insecticides and their Uses.
N. J. Agric. Expt. Sta. Bull. 169, 27 p.

See Supplementary abstract

1617
1903. Smith, J.B.

Recent observations and experiments with insecticides for the San Jose scale.

U.S.D.A.Office of Expt.Stations Bul.123,p. 126-128.

This is a summary of results ~~from the use of~~ with kerosene and crude petroleum used pure and as mechanical mixtures under New Jersey conditions.

1618
1904 - Smith, J. B.

Report of the Entomologist.
N.J. Agr.Expt. Sta. Ann.Rpt. 1903; pp.557-659.

Kerosene is still used undiluted by a number of growers for a summer application, with very good results. Sprayed thru a fine Vermorel nozzle on a sunny day, so as to cover and no more, it forms one of the most effective insecticides against plant lice, scale larvae and recent scale sets. Only peach is sensitive to the spray. As a winter spray it has lost favor. The mechanical mixture of kerosene and water, 15 to 25% is quite commonly used for summerwork and the stronger mixture is used for winter work against pernicious scale with unsatisfactory results on the whole.(over)

Kerosene emulsions with soap or milk are not much used. Kerosene in combination with soap is more injurious to plant life than the mechanical mixture. Crude oil is gradually fitting into its proper place. Oil is much better for pear than for any other of the orchard trees. Not only does it kill the scale but it exercises a specific effect upon the tree, forcing a rich, healthy growth and clearing up the fruit as nothing else can. Summer applications of crude oil are rarely made.

1619
1904. Smith, J. B.

The common mosquitoes of New Jersey.

N. J. Agr.Expt.Sta.Bul.171, 38 pp.

Pools and ponds should be sprayed with oil which kills the larvae and pupae of the mosquito.

1620
1904 - Smith, J. B.

Insecticide experiments in 1904.
N.J. Agr.Expt.Stas. Bul. 178; 12 pp.

See Supplementary abstract

1621
1905 - Smith, J.B.

Report of the Entomologist.

N.J. Agric.Expt.Stas.Ann.Rpt.1904;pp. 555-652

See Supplementary abstract

1622
1905 - Smith, J.B.

Insects Injurious to shade trees and Ornamental Plants.
New Jersey Agr. Expt. Stas.Bul. 181, 50 pp.

For leaf hoppers kerosene emulsion or one of the soluble preparations of kerosene or crude oil may be employed, all of which are effective in proportion to the thoroness of the application. Crude oil is recommended for San Jose scale, Kilo-scale, 1-20 is also recommended.

1623
1905 - Smith, J. B.

Late Fall Spraying for San Jose Scale.
N. J. Agr. Expt. Sta. Bul. 186, 14 pp.

Winter strengths of Killo-scale and soluble petroleum were put on before the foliage was off the trees. The damage to the foliage was slight and the effect on the scales good. Kill-o-Scale and Scalecide were applied at widely separated points in the state and with uniform results. Killoscale did slightly better as a winter wash but both did almost perfect work when applied at winter strength in Oct. No injury of any kind was caused on trees or fruit buds. Spring treatment with killoscale and Scalecide on peaches gave satisfactory results but they were not so completely effective as fall applications. The kerosene-limoid combination was generally a failure in N. J. This was due to probably the method of making rather than the combination itself. It is more than probable that as a late fall mixture it would be much more effective, and it should be as safe as the soluble petroleum combinations.

1624
1906 - Smith, J.B.

Report of the Entomologist.
N.J. Agr. Coll. Expt. Stas., Ann. Rpt., 1905 - pp. 527-687.

See Supplementary abstract

1625
1907 - Smith, J. B.

Report of the Entomologist.

N. J. Agr. Coll. Expt. Stas. Rpt. 1906; pp.515-609

See Supplementary abstract

1626
1907 - Smith, J.B.

Some Household Pests.
New Jersey Agr. Expt. Stas. Bul. 203, 48 pp.

Pouring gasoline or kerosene in the opening of the little hillocks will readily reach the small mound building ants. Gasoline is recommended for bedbugs, also for termites.

1627
1908 - Smith, J. B.

Report of the Entomologist.
N.J. Agr. Coll. Expt. Station Rpt. 1907; pp.387-478.

Soluble oils were dealt with at some length in the 1906 report; there is not much to be added in the matter of directions. Scalecide is most generally used. It has shown a distinct value as a fungicide in the leaf curl area. But results were not as good as with lime sulphur. It did not effect peach yellows, or peach rot or any of the diseases of apple of pear. Homemade miscible oils aredealt with at some length quoted entirely from the Delaware Station Bulls. 75 and 79, by Charles L. Penny.

1628
1908 - Smith, J. B.

Insecticide materials and their applications: With suggestions for practice.

N. J. Agric. Expt. Stas. Bul. 213; 46 pp.

See Supplementary abstract

1629
1909 - Smith, J. B.

Report of the Entomologist.
N.J. Agr. Coll. Expt. Stas. Rpt. 1908, pp.303-378.

Miscible oil is the most used material for the San Jose scale work on other than peach trees, and there are at least three new combinations on the market in competitions with Scalecide, Target Brand and the 95% oil referred to in the last report. One of these "Spray oils" was applied 1-15. The results were variable. San-U-Zay scale oil was not tried. This must be diluted with soda water, i.e. it required 3 lbs. of sal soda to 50 gals. water. Diluted 1-12 and before using. Carboline a new product of the Pratt Co. was not tried. The formula and directions are:

Carbolic acid 2 gals., red oil 2½ gals., potash 8 lbs., heat to 300°F and add petroleum or kerosene 5 gals., water 6 gals. The above is the emulsifier which is mixed as follows: Emulsifier 8 parts, petroleum 22 parts, water about 1 part. For use dilute with from 10 to 15 gals. of water.

1630
1910 - Smith, J. B.

Report of the Entomologist.
N.J. Agr. Coll. Expt.Sta. Rpt. 1909, p. 351-417.

Vacuum oil is a good scale killer at 1-12 and fairly effective at 1-15. It is unreliable at 1-20. This mixture leaves the trees with a more greasy appearance than the other miscible oils, and evidences of application remain much longer than with any other similar material. San-U-Zay was referred to in the 1908 report. Sufficient work was done to indicate that this material is fairly reliable and that it ranks with some other brands of commercial miscible oil in effectiveness.

1631
1911 - Smith, J.B.

Report of the Entomologist.
N.J. Agr.Expt.Sta.Rpt.1910; pp. 297-373.

The following materials were tried: Vacuum oil, Carboliene, Scalecide, U-Neek mixture, Spray-on-Scale-off and Soluble Paraffin; Spray-on-Scale-off was used 1-20. This material had a percentage of wool-grease in combination. The spraying was done in November. Examinations were made in the spring and summer. At the July examination when the scale had begun to breed, the "Spray-on" was not thoroly effective. It evidently needed to be used at a greater strength. Vacuum oil was applied 1-15. The U-neek mixture is a combination of wool-grease, petroleum and lime-sulphur in paste form. Dilution, 3 gals. water to 1 lb. of mixture. Soluble paraffin was diluted 1-12, Scalecide 1-15 and Carbolene 1-15. The Scalecide and Soluble Paraffin oil gave the neatest mixtures. Examination in October showed the Soluble Paraffin to have done perhaps a little the best work; but it had been applied at greater strength than the others. All the mixtures appeared to have been effective.

1632
1907 - Smith, J. B. & Dickerson, E.L.

The Cabbage and Onion Maggots.
New Jersey Agr.Expt. Sta.s Bul. 200, 27 pp.

Kerosene and sand mixture is made by adding to a pail of dry sand half a pint of kerosene and mixing thoroly. The applications should be made early, made frequenly and applied thoroly around the plants in the case of cabbage and along the rows in case of radishes and onions. The flies donot readily lay their eggs in this mixture and if any maggots on hatching come in contact with the kerosene they will be killed.

1633
1925. Smith, Kenneth M.

Further experiments in the control of certain maggots attacking the roots of vegetables.

Jour.Econ.Biol.vol.12,No.1,pp.77-92.

Paraffin emulsion consisting of 4 pints paraffin (oil), 1-1/2 lbs. soft soap and 10 Imp. gals. water was used. Did not show promise.

1634
1916. Smith, Longfield.

A new insecticide.
Rept.Agric.Expt.Sta.in St.Croix for the year 1914-1915, St. Croix, p. 30.

The following formula is given: Dissolve whale oil soap 4-1/2 pounds in 1000 cc.of Fusel oil, using a wooden paddle to stir with, and mix till thoroly dissolved, then add to this 8000 cc. of kerosene. The emulsion is very effective when used diluted 1 to 9 or 10.

1635
[illegible]

[illegible] as on [illegible]icide.

[illegible]
Bull. [illegible] 1-7[illegible].

Experiments made with dusts containing kerosene benzine and gasoline showed no promise as compared with nicotine. The addition of a small quantity of kerosene seemed to give nicodust a distinctly increased effect. About 5% of kerosene may be added to a fairly dry dust without destroying its dusting qualities

1636
1922- Smith, Ralph H.

Spider Mites Affecting Orchard and Garden Fruits.
Idaho Agric. Expt. Sta. Circ. 25, 8 pp.

Experiments were made to determine a method of destroying the winter eggs of the European red mite with dormant ~~xxx~~ sprays. Scalecide 1-15, 1-20 and 1-25; Dormant soluble oil 7-100; Distillate oil emulsion 6-100; and kerosene 1-10. Observations showed that dormant soluble oil, distillate oil emulsion and kerosene emulsion gave better control than any of the other spray materials used. When the eggs were hatching only in small numbers, branches of trees were sprayed with different

sprays including miscible oil No. 1, 6-100; Dormant Soluble oil 7-100; scalecide 1-15; 1-20, 1-25; Distillate Oil Emulsion, 6-100; Kerosene emulsion 1-10; Sprayemulsion, 8-100; Dormoil 8-100; Observations later showed these oil sprays to have given better control than the sulphur sprays.

1637
1923. Smith, Ralph, H.

Spreaders in relation to the theory and practice of Spraying.

Jour. Econ. Ent., vol. 16, no. 2, pp. 201 -207.

Miscible Oils are good spreaders but are incompatible with sulphur, Bordeaux compounds and arsenicals.

1638
1906 - Smith, R. I.

Spraying to Control the San Jose Scale.
Georgia State Bd. Ent. Bul. 21- pp.197-236.

Soluble oil preparations, Scalecide; "Target Brand" Scale Destroyer, and Kil-o-Scale were tried. These did not give results at the strength recommended by the manufacturers. It is thought that a greater strength should be used.

1639
1907 - Smith, R. I.

The Apple Wooly Aphis and Remedial Measures.
Green Apple Leaf Aphis and Remedies.
Ga. State Bd. Ent. Bul. 23, - 48 pp.

Kerosene emulsion used in all the experiments against wooly aphis was made by the following formula: Kerosene 2 gals. whale oil soap (any strong potash soap may be used) 1/2 lb., water 1 gal. This was emulsified in the usual manner. Kerosene emulsion killed all the aphids at every strength from the weakest to the strongest, (10% to 40%) wherever the emulsion came in contact with the infested roots. The odor of kerosene remained

in the soil and acted as a repellent. The 15% emulsion is generally believed to be the most effective. For dipping nursery stock 15% kerosene emulsion is recommended. At this dilution it did not prove as successful against the green apple leaf aphid as the tobacco decoction.

1640
1907. Smith, R. I.

Some Georgia insects during 1906.

U.S.D.A.Bur.Ent.Bul.67,pp.101-106.

10-15% kerosene emulsion has been used on the root form of the woolly aphis without injury to the roots of apple trees 2 to 10 years old.

1641
1906. Smith, R. I. & Lewis, A. C.

Some insects of the year in Georgia.

U.S.D.A.Bur.Ent.Bull.60,p.77-82.

Kerosene emulsion at 20 to 30% was found to be the best remedy for the woolly aphis of apple.

1919, Smyth, E. G.
1642
Report of the division of entomology
Ann. Rept. Porto Rico Insular Exp. Sta. 1918-19, pp 27-31

Paraffin oil emulsion (two sprayings at intervals of about 2 weeks) did not affect the mealybugs.

1919, Smyth, E. G.
1643
Report of the division of entomology
Ann. Rept. Porto Rico Insular Exp. Sta. 1st July 1917, to 30th June 1918, pp 109-129.

Red scale on an orange jessamine hedge was completely killed by paraffin oil-soap emulsion.

1644
1922. Snodgrass, R. E.

The resplendent shield bearer and the ribbed cocoon-maker. Two insect inhabitants of the orchard.

Smithsonian Rept.for 1920,pp.485-509, Pubn.No.2641.

Winter washes of miscible oils are recommended for killing the hibernating pupae in their cocoons.

1645
1915 - Snyder, T. E.
Biology of the termites of the eastern United States, with preventive and remedial measures.

USDA. Bur. of Ent. Bul. 94, Part II; pp. 13-85.

A treatment of "blue oil" is apparently effective in protecting wood against the attacks of "white ants", or termites, besides acting as a preservative generally. "Blue oil" is a residue left in the distillation of mineral oils after the isolation of kerosene and paraffin.(a)The oil should be a shale product; (b) its specific gravity(at 60° F.) should be 0. 873 to 0.883; (c) Its flash temperature should not be lower than 275°F. (close test).

1646
1916. Snyder, T. E.

Termites or "White Ants" in the United States; their damage, and method of prevention.

U,S.Dept.Agric.Bull.No.333.

Pure kerosene poured in the crevices where the ants are emerging will afford temporary relief.

1647
1916. Snyder, T.E.

"White Ants" as pests in the United States and methods of preventing their damage.

U.S.D.A.Farmers' Bul.759, 20 pp.

The use of kerosene and kerosene emulsion may afford some measure of relief from the damages of these insects. The kerosene or emulsion is drenched on the places of emergence.

1648
1919. Snyder, T.E.

Injury to Casuarina trees in Southern Florida by the mango borer.
Jour.Agr.Research,Vol.16,No.6,pp.155-171.
The Casuarina trees should be carefully examined and the larvae killed by spraying the affected part of the trunks with poisoned kerosene emulsion made by the following formula: Dissolve 1/4 lb.sodium arsenate in 1 gal. of water and add 1 pint of kerosene emulsion.

1649
1919. Snyder, T.E.

"White Ants" as pests in the United States and methods of preventing their damage.

U.S.D.A.Farmers' Bul. 1037, 16 pp.

See Farmers' Bul. 759.

1650
1924. Snyder,T.E. & Zetek, J.

Damage by termites in the Canal Zone and Panama and how to prevent it.
U.S.D.A.,Dept.Bull.1232, 26 pp.
A 20 to 30 % solution of paradichlorobenzene in kerosene can be used effectively to kill termites of the family Kalotermitidae. The infested wood is saturated with this liquid by swabbing it with a mop. A poisoned kerosene emulsion mixture can be similarly used by dissolving 1 oz.of sodium arsenite in each gallon of water used for diluting stock mixtures of kerosene emulsion or miscible oil.

1651
1926. Snyder, T.E.

Preventing damage by Lyctus powder-post beetles.

U.S.D.A.Farmers' Bul. 1477, 12 pp.

If there are large quantities of powder-posted stock, these should be treated with pure kerosene as a spray or with a saturated brush or mop or the infested wood should be immersed in vats of kerosene. Mixtures of 3 parts of coal tar creosote and 1 part kerosene, and 3 parts kerosene and 1 part creosote have been used successfully in killing insects in infested stock.

1652

1918. Sollmann, T.

The spreading power of coal oils.

Jl.Amer.Med.Assoc. Vol.LXXI,No.19,p.1553.

The spreading power depends largely on the presence of asphalt-like products. Most crude oils contain these products in sufficient quantity to spread well. Kerosene requires about 0.1% of asphalt varnish to spread well.

1653

1920. Southwell, T.

Fish and mosquito larvae in Bengal, Bihar and Orissa, India.

Ann.Trop.Med. & Parasit., Vol.XIV,No.2,pp. 181-186.

Oiling can not be done where fish are kept for destroying mosquito larvae.

1654

1891. Southwick, E. B.

Entomological Work in Central Park.

Insect Life, Vol.IV,No.1 & 2,pp.59-62.

The egg masses of Orgyia leucostigma were treated with an emulsion of petroleum and carbolic acid.

1655

1899. Southwick, J. M.

Insects.

Rhode Island State Bd.Agr.Bd.Rpt.1898,pp.83-94.

The R & H formula for making kerosene emulsion is given.

1656

1904 Spencer, J.

The Horn Fly

Va. Agr. Exp. Sta. Bul. 153, pp 67-77

The R & H formula is given using yellow soap. This is diluted 1-5 before spraying on the cattle. The emulsion is also an effective remedy for other parasites on live stock, such as lice, fleas.

1657

1919. Speyer, E. R.

Committee of agricultural experiments. Shot hole borer of tea.

Trop.Agriculturist,Peradeniya, Vol.LII,No.2, pp.67-69.

Rosin soap-fish oil-kerosene emulsion and rosin soap-kerosene emulsion were not entirely effective against the shot hole borer.

1658

1922 - Spuler, A.

~~The Orchard Leaf-roller.~~

Wash. Agr.Expt.Sta.Bul. 172, 9 pp.

Heavy miscible oils were used to destroy the over-wintering eggs of the leaf roller. 5 different brands of miscible oils were used but only 2 gave fairly good control when used in the early spring. To reduce spray injury, oil sprays should not be applied in the fall or in the spring until after danger of severe freezing has passed.

1659

1925 Stamm, A.J.

An experimental study of emulsification on the basis of distribution of size of particles.

3rd. Colloid Symposium Monograph 1925 317-23.

1660

1925 Stamm, Alfred J and Svedberg, The

The use of scattered light in the determination of the distribution of size of particles in emulsions. J. Amer. Chem.Soc. 47, 1582-96.

1661

1897- Starnes, Hugh N.

The San Jose and other Scales in Georgia.

Georgia Exp. Agr. Sta. Bul. 36, 31 pp;

Spray several times in the spring after the blossoms have fallen, with kerosene emulsions at 1-15 dilution as made by the formula: 8 oz. hard soap (ivory or whale oil); 1 gal. boiling water 1 qt. kerosene. Pump into itself several times. Then dilute with $2\frac{1}{2}$ gals. hot water. This gives 1-15 dilution. Better than this, is a 1 to 15 mixture of kerosene and water produced by a "Weed Kerosene Tank" attached to either a knapsack sprayer or in the form of the "[illegible]"

1662

1893. Stedman, J.M.

[illegible]

See Supplementary abstract

1663

1895. Steadman, J. M.

Insects injurious to stored grain.

Ala.Agr.Expt.Sta.Bul.61,pp.35-60.

The R & H formula is given for use on sucking insects.

1664

1896 - Stedman, J.M.

The Wooly Aphid of the Apple.

Missouri Agr.Expt Sta.Bul. 35; pp.36-61.

The aerial form of the wooly aphis can be easily killed by 1 or 2 sprayings with strong kerosene emulsion. Kerosene emulsion is made by dissolving $\frac{1}{2}$ lb. hard soap in 1 gal. of boiling water. Rain or soft water should be used; otherwise break the water by adding washing soda. Remove the soap and water from the fire and add 2 gals. of kerosene. Churn this mixture for 10 min. with a force pump. When ready to use add 19 gals. water to above mixture and mix thoroly. The root form may be controlled by saturating the ground with kerosene emulsion. Pure kerosene should never be used.

1665

1898 - Stedman, J.M.

The San Jose scale in Missouri.

Missouri Agr.Expt.Sta. Bul. 41, pp. 17-35.

Ordinary kerosene emulsion, so destructive to most scale insects, will not kill this insect except in its very early stages as young active lice.; later the scale covering ~~seems to protect them~~ from injury.

1666

1899 - Stedman, J . M.

The Tarnished Plant Bug.

Missouri Agr.Expt.Sta.Bul. 47, pp. 77-87

On large trees, kerosene emulsion has been found to be effective against the insect. It is made by dissolving $\frac{1}{2}$ lb. hard soap in 1 gal. of boiling water. Rain or soft water should be used or ~~break~~ broken hard water by adding washing soda. Remove from the fire and add 2 gals. of kerosene. ~~(or coal oil)~~ Churn for 10 minutes by means of a force pump. When ready to use add 19 gals. of water and mix thoroly. Since this emulsion kills by contact only it is necessary to reach and actually touch the insect with this spray. The spraying should be done early in the mornin when the bugs are sluggish otherwise they will leave the tree as soon as the first spray touches it.

1667

1902 - Stewart, J.H.

Treatment for San Jose scale.

W. Va. Agr. Expt.Sta. Bul. 78; pp. 213-230

The following treatments for San Jose scale are recommended: (1) kerosene and water 40% (2) Kerosene and vaseline; kerosene containing from 5 to 10% vaseline may be used on apple in winter but cannot be used on peach. (3) kerosene with vaseline and paraffin, 5 lbs. of crude vaseline and paraffin dissolved in 100 lbs. of kerosene forms a good winter spray for apple and pear. (4) Crude oils; crude oil 43°Be or over is safe on apple, pear and plum in winter. A 25% mixture may be used on peach. (5) Kerosene emulsion made by the R & H formula may be used on foliage when diluted 1-10.

1668

1903 - Stewart, J.H.

Treatment of San Jose scale.

W. Va. Agr.Expt.Sta. Circ. of Information 1,4 pp.

A 20-25% kerosene water spray for peaches, plums & cherries is recommended. For apples and pears 30-35% mixture. Crude oil should never be used undiluted. It should be used at same strengths as for kerosene.

1669 1903 - Stewart, J. H.

Nursery inspection in W. Va.
W. Va. Agr.Expt.Sta.Rept. on Nursery Inspection, 1901 and 1902; 64 pp.

Kerosene may be used for San Jose scale by combining it with soap to make an emulsion or by mixing it with water. A 20% mixture of kerosene and water seems to be necessary to kill scale on a badly infested tree. Crude oil has been used with some success. It should be diluted with water. A 20% crude oil mixture is best for stone fruits and 25-30% for pome fruits. Crude oil should never be used in fall or winter. This station prefers kerosene to crude oil. Tests with a number of oils and kerosene showed that any of them will kill the scale but they are likely to injure the trees. They are less injurious to trees and just as effective on scale when diluted with 3 or 4 parts water. Paraffin seemed to be the constituent most likely to injure the trees. Vaseline is not as injurious as paraffin.

1670
1895. Stinson, J.T.

Insects injurious to fruits and ...

Ark. Agr. Expt. Sta. Bull. 33. pp. 55-97.

See Supplementary abstract

1671
1916-Stone, Geo. E.

Shade trees, characteristics, adaptation, diseases and Care.
Mass. Agric.Expt. Sta. Bul. 170, pp. 123-264.

Kerosene oil can be used on shade trees under certain conditions without causing injury, while in other cases it will kill them. The oil soaks into the bark and often reaches the cambium and sapwood, destroying the tissue. Occasionally commercial oils used for spraying fruit trees for the San Jose scale cause local injury, and some shade trees have been known to be affected by their use. This is especially true of maples, and it is never safe to use oils of any sort on smooth bark trees.

1672
1898 - Stone, Geo. E., & Fernald, Henry T.

Fungicides, Insecticides and Spraying Directions.
Mass. Agr. Expt. Sta. Bul. 123, 32, pp.

Kerosene emulsion formula: Hard soap shaved fine ½ lb. dissolved in 1 gal. of boiling water and 2 gals. of kerosene poured into this while still hot; churn with a spray pump until it changes to a creamy and then a soft buttery-like mass. Use 1-9 for soft bodied insects, such as plant lice, or stronger in certain cases.

1673
1902 - Stone, George E., Fernald, Henry T., and Maynard, Samuel T.

Fungicides, Insecticides and Spraying Calendar.
Mass. Agr. Coll. Hatch Expt. Sta. Bul. 80, 15.pp.

Kerosene emulsion formula: 1/2 lb. hard soap shaved fine; 1 gal. water; 2 gals. kerosene. This was made in the usual way. Use 1-9 for soft bodied insects or stronger in certain cases.

1674
1904 - Stone, Geo. E., Fernald, Henry T. and Waugh, F.A.

Fungicides, Insecticides and Spraying Calendar.

Mass. Agr. Coll. Hatch Expt. Sta. Bul. 96, 16 pp.

Kerosene emulsion formula same as in Bul. 80, of this station.

1675
1920 - Stratford, G.

Control of red mite on apple trees

New Zealand Jl. Agric., Vol. XV. No. 3, pp 176-178

There was little distinction between the brands of oil used; all brands were successful in the destruction of winter eggs. The oils were used at 1-3 dilution.

1676
1920. Stratford, G.

Woolly aphis control tests at Papanui.

Jour.Dept.Agric.N.Zealand, Vol.21, No.2, p.85-6.

Spraying with red oil 1-10, heated to 120° gave the best results. Painting with red oil at 1-1 was a fairly good control.

1677
1905. Stuart, W.

Preparation and use of sprays; spray calendar.

Vermont Agr.Expt.Sta.Bul.113, pp.95-108.

The R & H formula for kerosene emulsion is given. The sour milk formula is also given.

1678
1907. Stuart, Wm.

Early spring applications of insecticides for the oyster-shell scale.

Vt.Agr.Expt.Sta.19th Ann.Rept.1905 & 1906, pp.293-4.

A summer treatment of the infested trees, soon after the young have hatched, with kerosene emulsion is an effective means of controlling the pest.

1679
Sturgis, W.C.
1893.

Report of the Mycologist. Miscellaneous Notes
Conn. State Agr. Expt. Sta. Report for 1893, p. 72-87
Aster beetles p. 86; Quince leaf miner pp. 80-81.

The larvae of the quince leaf miner pass the winter in a case of leaves and branches of the tree. Spray the tree with strong kerosene emulsion after the leaves have fallen. Most of the cases will be penetrated by the oil and the enclosed larvae killed.

1680
Sturgis, W. C.
1894.

Some injurious insects.

Conn. State Agr. Expt. Sta. Rpt. 1894, pp 139-142.

For aphids of apple and cherry trees, kerosene emulsion is the most practical substance. A modification of the kerosene emulsion formulae is suggested (1) To 3 qts. of kerosene add 1¼ lbs. of pyrethrum powder and let stand for 4 days in a closed vessel. (2) Dissolve 10 oz. of common hard soap in 2½ qts. of boiling water. Strain off 2½ qts. of (1) and add it to (2) while the latter is still hot. Churn for 5 min. thru a force pump. For use, dilute with 150 parts of cold water. The undiluted portion may be kept in thoroly closed jars.

1681
Sturgis, W. C. & Britton, W. E.
1895.

The San Jose Scale.

Conn. State Agr. Expt. Sta. Bull. 121, pp. 6-14.

Dilute kerosene emulsion is advised for keeping the scale in check during the summer. Kerosene 2 gals, common soap or whale oil soap 1/2 lb., water 1 gal., Heat soap solution and add it boiling hot to the kerosene; churn the mixture by means of a force pump for 5-10 min. If water is hard, add a little lye or soda For use, dilute with 9 times its bulk of cold water. Apply at least three times during the summer.

1682
1920 - Sullivan, K. C.

An investigation of the dipping and fumigation of nursery stock.

Mo. Agric. Expt. Sta. Bul. 177,

See Supplementary abstract

1683
1924. Sullivan, K.C. & McBride, O.C.

The effects of oil spray on apple aphids.

Jour.Econ.Ent.Vol.17, No.6, p.659-660.

In no case did any of the oil sprays used give effective control as compared to the checks. From the results lubricating oil emulsions can not be recommended for complete control of apple aphids.

1684
1900 - Summers, H.E.

Insecticide Methods.

Iowa Agr.Col.Expt.Sta.Bul. 50, pp. 13-23.

Kerosene and water mixture is a cheap and effective insecticide. Unless used with care it is very apt to injure foliage. Kerosene emulsion is made by the formula; Soap ½ lb. (ivory or whale oil) dissolved in 1 gal. of water (soft or broken). This mixture boiling hot is added to 2 gals. kerosene. The entire mass is emulsified by a force pump. Whale oil soap is preferable as it is an insecticide and makes a more permanent emulsion. To use dilute 1 part emulsion with 8 to 14 parts water. Use weaker dilutions for tender foliage; Medium for apple, pear, and other similar hardy trees; Strongest for late autumn or winter sprays.

1685
1902 - Surface, H.A.

Insects injurious to cucurbitaceous plants.

Penn. Dept. Agric. Bul. 96, 30 pp.

A mechanical mixture of kerosene and water applied with a kerowater sprayer is recommended for squash bugs and should not be used above 8% oil. The R & H formula for kerosene emulsion is given. This has an advantage over the kerosene and water in that it is not as liable to injure foliage. It is recommended for plant lice and squash bugs. Gasoline and benzine are recommended when they can be used under cover. The fumes of these substances will kill insects.

1686
1906, Surface, H. A.

The Monthly bulletin of the division of Zoology.

Penna. Dept. Agr. Monthly Bul. Div, Zool. IV, no.3 pp. 82-112.

Tests were made on lilac for the scurfy scale with 5, 6, 7, 8, and 9% kerosene emulsion with very good results. The percent kill varying from 95 to 9%. Summer remedies for scale insects are kerosene emulsion 10% and kerosene and water mixture applied with a kerowater sprayer. Commercial insecticides, which are mostly crude oils slightly modified, can also be used with ~~(more or less)~~ varying degrees of success.

1687
1908. Surface, H. A.

Homemade soluble oils.

13th Ann.Rpt.Penn.Dept.Agr.1907, pp.520-521.

This is similar to the home made soluble oils of the Delaware and Connecticut stations. The emulsifier is made up of carbolic acid (100%) 2 quarts; fish oil (whale or Menhaden), 2-1/2 qts; caustic potash, 1 lb. The oil formula is as follows. The above emulsifier, 8 parts; crude oil, 4 parts; Resin oil, 4 parts, water, 1 part.

1688
1908. Surface, H. A.

Home-made soluble oils.

Pa.Hort.Assn.Rept.for 1908,p.85-86.

The soluble oil is made by the following formula: Emulsifier 8 parts, crude oil, 4 parts, resin oil, 4 parts, water 1 pt. The emulsifier is made as follows: Carbolic acid, 2 qts., fish oil 2-1/2 qts., caustic potash, 1 lb.

1689
1924. Susainathan, P.

Fruit sucking moths of South India.

Rept.Proc.5th Ent.Meeting Pusa,Feb.1923, pp. 23-27.

Crude oil emulsion sprayed at a strength of 1 lb. in 8 gals. of water acted as a deterrent against the moths on orange and pomegranate trees.

1690
1916. Swaine, J. M.

Injurious shade tree insects of the Canadian prairies.

Agric.Gaz.Canada, Vol.III,No.3, pp.215-220.

Kerosene emulsion made by the R & H formula is effective for plant lice and sucking insects. For use on foliage it must be diluted 1-9 to 12.

1691
1917. Swaine, J. M.

Some features of interest in connection with our studies of forest and shade tree insects.

47th Ann.Rept.Entom.Soc.Ontario for 1916,pp. 95-106.

Kerosene emulsion diluted 1-5 was fairly effective when applied to foliage containing all sizes of the alder leaf miner.

1692
1922. Swellengrebel, N. H.

Tijdelijke en plaatselijke ophooping van Anopheles Maculipennis om Amsterdam.

Nederlandsch Tijdschrift voor Geneeskunde, 1922, vol.LXVI,no.4,pp.350-359.

The results were less pronounced in 1921 when the breeding places were treated with kerosene.

1693
1911. Swenk, M. H.

Spraying for the melon aphis.

Nebr.Agr.Expt.Sta.24th Ann.Rept.pp.35-57.

Kerosene emulsion at 4, 5, 6 & 8% killed the vines and also the aphids. This remedy could not be recommended.

1694
1920. Swenk, M. H.

The harlequin cabbage bug.

Nebraska State Ent.Bull.10, 4 pp.

The nymphs of the cabbage bug will succumb to a 10% kerosene emulsion. Pure kerosene sprayed on adult bugs will kill them, but also kills the plants.

1695
1921. Swezey, O. H.

Ox bot fly or warble fly, Hypoderma lineata.

Hawaiian Planters' Record, Vol.XXV,No.1,pp. 23-25.

Kerosene may be used for killing the maggots of the bot fly.

1696
1903. Symons, T. B.

The San Jose scale.

Md.Agr.Expt.Sta.Bul.90,24 pp.

20% kerosene emulsion was the most satisfactory for summer treatment; Lime-kerosene emulsion was effective in comparison with kerosene emulsion, Crude petroleum was also very effective at 20-25% strengths. It can not be recommended as a summer treatment.

1697
1904 - Symons, T.B.

Experiments on control of San Jose Scale.

Maryland Agric. Expt. Sta. Bull. 90; 24 pp.

Kerosene emulsion was made by the formula; 10 gals. oil 2½ lbs. soap; 5 gals. water. It was used at 15,20, & 25% strengths. Lime-kerosene emulsion made by the formula, lime 5 lbs., kerosene 9 gals. water ½ gals, was used at 15, 20, & 25% strengths. Crude petroleum emulsion made by the formula, 8 gals. of oil, 2 lbs. soap; and 4 gals. of water was used at 10 & 15, 20 & 25% strength. The kerosene emulsion 20%, was the most satisfactory treatment for summer spraying. Lime-kerosene emulsion was about equal to the kerosene emulsion treatment.

At 20-25% strengths it is very effective against the scale. The lime shows the extent to which the tree is covered. But the lime does not emulsify as readily as the soap. Crude petroleum emulsion is very effective against the insect when used at 20-25%. It burns foliage at 10% and cannot be used as a summer spray. The 20% kerosene emulsion appeared to be the best wash to apply in the early fall.

1698
1906 - Symons, T.B.

The Oyster Shell Scale.

Md. Agr.Expt.Sta. Bul. 111, pp. 57-70

Experiments with kerosene emulsion applied just as the young scale insects are crawling early in May showed that this emulsion was very effective. Exceptional results were obtained. The Tak-a-Nap soap used in making the emulsion was very satisfactory as it dissoved easily in cold water. The emulsion was made by pouring 7½ gals. of kerosene in the spray pump barrel. 1½ lbs. soap were dissolved in 5 gals. water (boiling). The hot soap solution was then poured onto the spray barrel and emulsified by pumping the mixture into itself for 10 minutes. If 37½ gals. of cold water are added, there will be a 15% emulsion.

1699
1908 - Symons, T.B.

Miscellaneous Treatment for San Jose Scale.
Md. Agric. Expt. Sta. Bul. 131, pp. 129-149.

Spraying experiments were made with soluble oils. San-U-Zay (applied 1-15 and 1-20); The oil being of a heavy grade, some difficulty was experienced in getting the solution to mix readily with water. There was little difference between the two strengths. The treatment proved ineffective. Target Brand Scale Emulsion (applied 1-15 and 1-20) was easy to apply and mixed readily with water. Results with 1-15 were satisfactory. Orchard Brand Soluble Oil (applied 1-15 and 1-20) was easy to apply and mixed readily with water. Results with 1-15 were satisfactory. Salable nursery trees (apple and peach) were dipped instantaneously in Scalecide 1-15, Target Brand 1-15, Soluble oil 1-15, and Kil-O-scale 1-15. The trees showed no injury and were clear of scale. A similar experiment was made with trees which were just beginning to leaf. There was injury only to the tops. No scales were found. Trees should be dipped while dormant.

1700
1909. Symons, T. B.

Summary of fumigation and dipping experiments.
Jour.Econ.Ent.Vol.II,No.2,pp.169-173.

Peach and apple trees were dipped in Scalecide, Target brand emulsion, soluble oil and Kilo-scale, the oils being diluted 1-15. No trees showed any injury and no scale could be found when examined at a later date.

1701
1906 - Symons, T.B., Coffin, T.H., & Gahan, A.B.

The Mosquito.
Maryland Agr. Expt.Sta. Bul. 109 pp. 73-124.

Oils depend for their larvicidal value upon their strangling effect upon the wrigglers. When a thin film is formed over the surface of a pool, ~~and as~~ the larvae ~~have to~~ come to the surface to obtain air ~~they~~ come in contact with the oil film and their breathing pores are clogged with it. Kerosene oil will form an even film and kill all the larvae and pupae provided the entire surface is covered. Crude petroleum is not as satisfactory.

1702
1910- Symons, T.B., & Cory, E.N.

The Terrapin Scale.
Md. Agr. Expt. Sta. Bul. 149, pp. 83-92.

See Supplementary abstract

1703
1911 - Symons, T. B., Cory, E.N., & Babcock, O.G.

Treatment for San Jose Scale and Terrapin Scale Insects.
Maryland Agric. Expt. Sta. Bul. 161, pp. 221 - 234.

The following oils were tested on Terrapin scale, Vacuum oil, Soluble oil, San-u-zay, Scalecide, Spray oil, Spray On, One for All and Scale Oil; Vacuum oil 1-15; San-u-zay 1-15; Soluble oil 1-20, 1-15; Spray oil 1-15; One for All 1-4; Spray On 1-15, were successful in the control of the scale; while Scalecide 1-15, San-u-Say 1-15; One for all ~~1-4~~ were unsuccessful. Difficulty was experienced in mixing both San-u-zay and One-for-All in the spraying tests. They were effective as fall sprays. Miscible oils appear to be the best treatment, for the terrapin scale, applied just before the buds open in the spring. Peach trees may be attended by injury if any of the oils are used.

1704
1905 - Symons, T.B., & Gahan, A.B.

Spraying experiments for San Jose Scale in 1905.
Maryland Agric. Expt. Sta. Bul. 107; pp. 57-62.

The results of spraying with kerosene limeoid 20% were not as good as spraying with lime sulphur and salt mixtures. The results of K-L 25% were very disappointing as regards its efficiency as a winter wash.

1705
1908 - Symons, T.B., Norton, J.B.S., & Close, C.P.

Nurseries and Nursery Inspection.
Maryland Agr.Expt.Sta.Bul. 130, pp.79-128.

Kerosene emulsion formula: Kerosene 2 gals. common soap, 1/2 lb. water 1 gal. Dissolve the soap in boiling water, add the kerosene and emulsify by violent churning. This emulsion is used for black peach aphis, green apple aphis (15%); oyster shell scale (15%) and the scurfy scale.

1706
1909 - Symons, T. B. & Peairs, L.M.

The San Jose scale and Osage Orange Hedge.
Maryland Agr. Expt.Sta. Bul. 140,pp. 87 - 101.

Experiments made with scalecide 1-15 gave very good results. With fall and spring applications (1-20 strength) results were irregular. Orchard Brand Soluble oil 1-15 applied both spring and fall gave satisfactory results. San-U-Zay was thick and it was necessary to add 3-5 lbs. of sal soda to 50 gals. of water to obtain an emulsion. Used in fall and spring at 1-15, it killed scale very well, but spring applications killed considerable wood in the tops of trees. Target Brand applied 1-15 was unsatisfactory.

1707
1910-Symons, T.B., Peairs, L.M., & Cory, E.N.

Spraying, Fumigating and Dipping for the Control of San Jose Scale.

Md. Agric. Expt.Sta., Bul. 148, pp. 47-81.

See Supplementary abstract

1708
1907 - Symons, T.B., & Weldon, G.P.

Spraying for San Jose Scale.

Maryland Agr. Expt.Sta. Bul. 123, pp. 139-152.

See Supplementary abstract

1709
1916, Symons, S. T. D.

Tick-bite in stock and its treatment

Agric. Gaz. N.S.W., Vol. XXVII, No. 11, p. 767

A small quantity of kerosene may be dropped on each tick, and the following day the dead tick may be snipped off with scissors.

1710
1892 - Taft, L. R.

Insecticides and Fungicides.
Mich. State Agr. Coll. Expt.Sta. Bul. 83; 26. pp.

Cook's formula for making kerosene emulsion is given with recommendations for use against apple aphis, bark lice, scale and all similar insects.

1711
1894 - Taft, L. R.

Mich. State Agr. Coll.Expt.Sta.Bul. 103; 62pp.

Kerosene emulsion is prepared by heating 1 qt. of soft soap until it becomes liquid and adding 1 pt. of kerosene. This should be agitated violently with a force pump for 3 to 5 minutes. Before useing add 6 qts. water so that the kerosene will be 1/16 part of the mass. To be effectual the remedy must come in contact with the insect.

1712
1895. Taft, L. R.

When and what to spray. Spraying
Mich.State Agr.Coll.Expt.Sta.Special/Bul.March, 9 pp.

Kerosene emulsion is recommended for all sucking insects. The following formula is given: 1 qt. of soft soap is warmed, then 1 pt. of kerosene is added, and the mixture is agitated until no kerosene separates out. This is diluted with 6 quts.of water before using.

1713
1896, Taft, L. R.

The black peach aphis

Michigan Sta. Agr. Coll.,Exp. Sta. Rpt., for 1896, pp 125-127.

Kerosene emulsion was used on the black peach aphid with apparent success.

1714
1896 - Taft, L. R.

The apple orchard; Spraying - Why and How.

Mich.Agr. Coll. Expt. Sta. Special Bul. 4; 19 pp.

Kerosene emulsion for sucking insects is prepared by heating 1 qt. of soft soap until it becomes liquid. After removing from the fire add 1 pint of kerosene. This mixture is agitated for 5 minutes. Add 6 qts. of water before using. The hard soap emulsion is prepared by dissolving 4 oz. in 2 qts. of boiling water ~~and~~, adding 1 pt. kerosene and ~~prepared~~ treated as with soft soap. Before using dilute with 5 qts. water. Whale oil soap can also be used.

1715
1900 - Taft, L.R.

Spraying Calendar.
Mich.Agr. Coll. Expt.Sta. Spec. Bul. 15

Kerosene emulsion formula using soft and hard soap same as in special bul. 4 of this station.

1716
1905. Taft, L. R.

Timely topics.

Nat'l Fr.Grow.Tenth yr.Whole No.111,March,1905, p.3.

Kerosene and petroleum mixtures are not as effective as the sulphur lime and salt mixture. They have wet or spreading qualities. Kil-O-Scale, a sulphurated petroleum resin compound, gives good results against immature forms of the San Jose scale. Kerosene-limoid made according to the Delaware formula gives good results as a remedy for San Jose scale when applied in the winter or early spring.

1717
1907. Taft, L. R.

Orchard spraying.

Mich.Agr.Expt.Sta.Spec.Bul.37, 32 pp.

The soluble oils were not as effective on the scales as lime sulphur. 1-10 dilution was more effective than the 1-20 dilutions of kil-o-scale, Target brand, Scalespray and Scalecide. Kerosene and lime was more effective than the soluble oils.

1718
1896- Taft, L. R. & Davis, G. C.
Pests of orchard and garden.
Mich. State Agr.Coll.Expt.Sta.Bul. 121, 80 pp.

Kerosene emulsion is a well known remedy for soft bodied insects that do not feed by chewing, but suck the sap instead. The emulsion is cheap, simple and effective. Soft soap formula: Heat one gallon of soft soap until it becomes liquid, add 2 gals. of kerosene and agitate for 3 or 5 minutes so that the oil and soap will become permanently mixed. The emulsion is 1/3 oil and for plants must be diluted with 4 times its bulk of water. Hard soap formula: To 2 qts of water add ½ lb. of hard soap, heat to boiling point and when soap is dissolved add 1pint of kerosene and proceed as in soft soap formula. This should be diluted with twise its own bulk of water befose using.

1719
1906. Taft, L. R. & Farrand, T. A.

Report of the South Haven substation for 1905.

Mich.Agr.Expt.Sta. Spec.Bul.35. p.6-7.

Scalecide and kil-o-scale at dilutions of 1-20 and 1-25 were fairly satisfactory. The strength will have to be increased to get better results. Kerosene and lime was the most efficient remedy tested. The miscible oils injured the foliage to a slight extent.

1720
1909 - Taft, L.R. & Shaw, R.S.
Spraying Calendar.

Mich.Agr.Coll.Expt.Sta.Special Bul. 45.
The various "soluble" oils are ineffectual against scale at the strengths recommended. These remedies are expensive and have little fungicidal value. By using them twice as strong as recommended their efficiency will be increased and unless very carefully used, injury may be done to the trees.

1721
1909 - Taft, L. R. & Wilken, F.A.
Tests of scale remedies and summer sprays.

Mich.Agr Coll. Expt. Sta. State; Spec.Bul. 48; pp.20-24

Target brand scale destroyer gave very poor results. Water soluble oil gave quite good results, although not as good as lime sulphur; these were tested on pear trees; They have no fungicidal value.

1722
1925 Tanner, W. Lee

Arsenated petroleum oil as a wood preservative.
J. Ind. and Eng. Chem. 17, p. 167.

Insecticidal

1723

Tauss, Jenö and Wolf, H. (Determination of olefine constituents of petrols and lamp oils.) Ztschr. angew. Chem., Jahrg. 32, 1919, pp. 317-319. Jour. Soc. Chem. Ind., vol. 38, Dec. 15, 1919, p. 889A. Describes method.

1724
1907. Taylor, E. P.

The Howard scale.

Colo.Agr.Expt.Sta.Bul.120,19 pp.

Scalecide was used with promising results. Kerosene-lime emulsion proved a failure.

1907 - Taylor, E. P.
1725 Economic work against the Howard scale in Colorado.

USDA Bur. of Ent. Bul. 67; pp. 87-93.

Kerosene emulsion, 20 to 30% kerosene, prepared with slaked lime was almost a complete failure. Scalecide gave much promise against this scale.

1726
1908. Taylor, E. P.

Life history notes and control of the green peach aphis, *Myzus persicae*.

Jour. Econ.Ent.Vol.I,No.2,pp.83-91.

5% kerosene emulsion and Scalecide 1-20 were promising insecticides ~~used~~ against this insect.

1727
1908 - Taylor, Estes P.
Remedies for San Jose Scale.
Missouri State Fruit Expt.Sta.Circ. 3, 4 pp.
Crude oil emulsion applied in the fall after the leaves are off or in the spring about 2 weeks, before buds open at 10% dilution is effective against the scale. Injury has resulted in some cased from their use. Homemade oil emulsions made with kerosene are not recommended except as emergency summer sprays as 7% strength. Mechanical mixtures are not recommended. Process for making miscible oils are given in Del. Agr. Expt. Sta.Bul. 75 and 79, also in Penn.Agr.Expt.Sta. Bul. 86; There are many commercial miscible oils on the market such as scalecide, target brand scale destroyer, kiloscale, sure kill and San-u-Zay scale oil.

1728
1908 - Taylor, E. P.
Scale Insects of the Orchards of Missouri.

Missouri State Fruit Experiment Sta. Bul. 18, pp. 7-87.

See Supplementary abstract

1729
1908 - Taylor, E. P.
Homemade Oil Emulsion.
Mo. State Fruit Expt.Sta.Circ.4, 3 pp.

See Supplementary abstract

1730
1916 - Taylor, E. P. & Willis, M. A.
Spraying Calendar.
Idaho Univ. Agr.Expt.Sta. Depts. Hortic. and Botany, Circ. No. 1, 1 p.
Kerosene emulsion formula: Kerosene 2 gals., whale oil soap 1/2 lb., water 1 gal. Dissolve soap in hot water add kerosene to hot suds. Agitate mixture to emulsify. Dilute this stock at the rate of 1-9 for average summer spraying.

1731
1903. Taylor, M. L.

Campaign against mosquitoes in Sierra Leone.

Jour.Trop.Med.Vol.6,No.3,p.52.

The larvae are killed by crude kerosene when quite small. The oil is simply poured on the water.

1911 Theiler, A.
1732 Diseases, ticks and their eradication.
Agric. Jour. Union of S. Africa, Vol.I, No. 4, P 491 -508

The following dip formula is given: 5-1/2 lbs soft soap; 2 gals. kerosene; 8-1/2 lbs arsenite of soda, 400 gals. water.

1733
1900. Theobold, F. V.

The small ermine moths.

Jour.Bd.Agr. (London)Vol.7, No.2,pp.167-169.

The best spraying solution is prepared by dissolving 7 lbs. soft soap in 7 gals. boiling water and to this adding 1/2 gal. kerosene or petroleum oil, and vigorously agitating, the whole being diluted to 25 gals. before use.

1734

Theobald, Fred V.
1909. Insect and other allied pests of orchard, bush and hothouse fruits and their prevention and treatment.

Wyc. XVI 550 p (Book)

See Supplementary abstract

1735

1915 - Thomas, E. A.

The Cabbage Harlequin or Calico Bug.
S. C. Agric. Expt. Sta. of Clemson College, Circ 28
4 pp.

The bugs collected on trap crop planted to protect the cabbage are destroyed with kerosene or a 25% emulsion of kerosene.

1736

1909. Thomsen, F.

Notes on termites.

Transvaal Agric.Jour.Vol.VII,No.27,pp.512-520.

Kerosene was useless for preserving wood against the ravages of termites.

1909, Thorby, G. A.

1737 Destroying house blow flies
Agri. Gaz. N.S. Wales Vol.20, No. 11, p. 963

A metal trough is fitted into the windows on the sill. Kerosene is poured in the trough. The blow fly hits the window and usually falls into the kerosene.

1919. Tirunarayana Iyengar, M. O.

1738 On the results of a mosquito-survey of Indou City.
Indian Jl.Med.Research,Calcutta,Special Indian Science Congress Number,1919,pp.26-39.

Oiling is suggested for pools and puddles that can not be otherwise dealt with.

1905 - Titus, E. S. G.

1739 The cotton red spider.
U.S.D.A. Bur. of Ent. Circ. 65; 5 pp.

Dissolve 1 lb. hard soap or 1 qt. of soft soap in 1 gal. hot water and add 1 gal. kerosene and emulsify. When diluted 10 times it is effective against this insect,

1740

1905. [illegible]

Notes on scale insects in Arizona.
Agr. Expt
[illegible] Sta. Bull. 14.

See Supplementary abstract

1907, Tower, W. V.

1741 Report of the entomologist and plant pathologist
Porto Rico Agr. Exp. Sta. Rpt. 1906, Pp 25-28

Kerosene emulsion does not seem to kill the red or circular scale on oranges. Kerosene and crude oil emulsions do not give satisfactory results on the purple scale.

1742 Tower, W. V.

Control of the Brown Ant and the Mealy Bug in Pineapple Plantations
Porto Rico Agr. Exp. Sta. Cir. 7, 3pp

Kerosene emulsion containing a small amount of crude carbolic acid has given the most satisfactory results in killing the mealy bug and the ants. Crude oil sprays did not prove effective. The R. & H formula for kerosene emulsion was used with the addition of 1 pt of crude carbolic acid.

1908, Tower, W. V

1743 Report of the Entomologist and plant Pathologist
Porto Rico Agri. Exp. Sta. Rpt. 1907, pp 31-38

Kerosene emulsion made by the R & H formula has given good results on the scale.

1909, Tower, W. V.

1744 Report of the Entomologist, R
Porto Rico, Agr. Exp. Sta. Rpt.1908, Pp 23-28.

Kerosene and crude oil emulsion applied at intervals of 3 weeks have given good results for the various scales.

1911, Tower, W. V.

1745 Insects injurious to citrus fruits and methods for combating them.

Porto Rico Agr. Exp. Sta. Bul. 10, 35 pp.

Miscible oils were made according to the formulas given in Delaware Bul. 79. The R & H formula for making kerosene oil emulsion is given. The same formula was used for crude oil. Crude carbolic acid was used with the kerosene and crude oil emulsions. The oil particles were more finely divided, their diameter being only 1/3 to 1/4 the size of those made without the carbolic acid. The killing power of these emulsions was greater than of those made without carbolic acid, and they were more stable.

1746

1892. Townsend, C. H. T.

Notices of importance concerning fruit insects.

N.Mexico Agr.Expt.Sta.Bul.5, 11 pp.

The R & H formula is given for use. on the vine leaf hopper when diluted 1-15.

1747

1892 - Townsend, C. H. T.

Scale Insects in New Mexico.
N.Mexico Agr.Expt. Sta. Bul.7, pp. 23 pp.

The R & H formula for kerosene emulsion is given. As a summer wash for San Jose and other scales on apple pears, etc., dilute 9 times with cold water. For use on peach, dilute 15 times.

1748

1925 - Trimble, F.M.

Scales insects injurious in Pennsylvania.
Penn. Dept. Agr. Gen. Bul. 398, (Vol. 8, #2) 21 pp

A spray for scale insects on the greenhouse plants is made from the following formula: Solution I: Kerosene 8 oz., and oleic acid 1 oz. Solution II: Nicotine (40%) 2 oz., water 8 oz. The oleic acid is poured into the kerosene slowly, stirring constantly. The nicotine and water are mixed in another vessel. The two solutions are then united forming a mixture with a creamy consistendy. For scales on palms and similar hardy plants, 1 fluid oz. of the stock is diulted with 1 gal. water. The plants should be syringed with water the morning following the application of the spray. Oil sprays have taken the place of lime sulfur for heavy infestations of scale insects. The common lubricating oils, such as Diamond Paraffin, Red engine, Nabob and 188 Red Neutral, which have a paraffin base, have given good results. The regular engine oil emulsion formula is given with direction for preparing and diluting. Another similar formula is given in which the soap is replaced by 4 oz. of Kayso. No heat is needed in making this emulsion.

1749

1891. Troop, J.

Report of the Horticulturist.

Indiana Agr.Expt.Sta.Rept.1891,pp.19-22.

Kerosene emulsion was used on plum, cherry and maple trees for aphids and Pulvinaria with very satisfactory results.

1750

1894- Troop, James.

The Fruit Bark Beetle, (Scolytus rugulosus Rats.)
Indiana Agr. Exp. Sta. Bul. 53, pp. 126-130.

Plum and cherry trees were sprayed with a strong solution (double strength) of kerosene emulsion. These were not affected at all. While others standing near to them that were not sprayed were badly punctured by the bark beetle.

1751

1898 - Troop, James.

Insecticides, Fungicides and Spraying.
Purdue Univ. (Ind). Agr. Expt. Sta. Bul. 69, pp.35-40

Kerosene emulsion is made by dissolving 1/2 lb. hard soap in 1 gal. soft water. While still hot, remove from fire, add 2 gals. of kerosene. Force thru a pump until it has the consistency of cream. For hard bodied insects such as common scale, etc. use 1 part as stock to 8 or 10 parts water. For soft bodied insects such as plant lice, etc. use 1 part stock to 15 or 20 parts water. Apply as a fine spray.

1752

1899-Troop, James.

The San Jose and other scale insects, and the Indiana nursery inspection law.
Purdue Univ. Ind. Agr. Expt. Sta. Bul. 78, pp. 45-52.

Use strong kerosene emulsion for San Jose scale while trees are in a dormant condition. Also for oyster shell and scurfy scale.

1753
1902. Troop, J.

Report of the horticulturist.

Indiana Agr.Expt.Sta.Rept.for 1902,pp17-18.

Crude petroleum was tested as to its efficiency against the San Jose scale. Crude petroleum often injured trees. It tested 33°Be.

1754
1907 - Troop, James & Woodbury C. G.

How to control the San Jose scale and other orchard pests.

Purdue Univ. (Ind.) Agr.Expt.Sta.Bul. 118,pp.397-423.

Kerosene emulsion is a well known remedy for soft bodied insects. To prepare it dissolve 1 lb. hard laundry soap in 1 gal. water. If water is hard, add a little sal soda to soften it. Add 2 gals. of kerosene and agitate violently for 5 or 10 minutes. The dilution depends upon the plants to be sprayed. Use 1 gal. of stock to from 10 to 20 gals. water. A better emulsion can be made by using whale oil soap in place of the laundry soap.

1923, Tryon, H.
1755
Orange tree bug

Queensland Agric. Jl. Vol. XX, Pt. 4, pp 301-302

Kerosene resin emulsion 1-7 only destroyed 50% of the young bugs.

1923, Tryon, H.
1756
The citrus bug

Queensland Agric. Jl.Vol.XX,Pt.3,pp 181-182.

Resin and kerosene emulsion proved fatal when brought into contact with the insects by spraying

1896 - Tryon, H.
1757
The Australian Sugar Cane Pest

Queensland Dept. Agr. Rpt. 1895-96 56 pp

Kerosene emulsion made by the R & H formula may be used against the sugar cane grub.

1758
1913. Tschaen, E.

Le pêcher dans le Sud-Est.

Jour.d'Agric.Pratique,Vol.77,T.25,p.366-369.

The following formula is given for use on the peach aphids: Soft soap,1%, tobacco juice 1 %, petroleum 1/2%, A scale (Lecanium cymbiforme) on peach may be destroyed with a wash of black soap 12 kilog; petroleum 8 liters, water 100 liters.

1759
1917. Tuason, D. R.

A study of cucurbitaceous vegetables in the Philippines.

Philippine Agriculturist & Forester, Vol.V,No. 10, pp.315-342.

The R & H formula for kerosene emulsion is given. A dilution of 1-30 was used for melon aphids.

1760
1914 - Tucker, E. S.

Suppression of the Cottony Cushion Scale in Louisiana

Louisiana Agr. Expt. Sta. Bul. 145, 8 pp.

Dissolve 2 lbs. of whale oil soap in 2 gals, of hot water, then remove from fire, and mix with 4 gals. of kerosene. To reduce to 15% strength, dilute 1 gal. of stock plus 3½ gals. of water and add 1 oz. KCN per each gal. ~~of the amount~~. This spray gave good results but is dangerous to handle.

1761
1916. T[illegible]

The Oak Scale [illegible] its control.

Ala. Agr. Coll. Expt. Sta. Cir. 28, . . 105-110

See Supplementary abstract

1762
1918- Turner, William F.,

Pecan Insects,

Ga. State Board Ent. Bul. 49, pp. 1-37.

Experiments were made on the Pecan leaf ~~case~~case-bearer during the winter of 1916-17, using miscible oils and home made oil emulsions. These sprays were absolute failures in the control of this insect.

1763
1915. Tylor, A. R.

Spraying for the control of the walnut aphis.

Calif.Agr.Expt.Sta.Circ.131,11.pp.

Distillate oil and kerosene oil emulsions were used at 1% and 4% respectively. Only fair results were obtained from their use as summer sprays. No injury resulted from the kerosene, but some spotting from the distillate.

1764
1921. Uichanco, L. B.

The rice bug (Leptocorisa acuta, Thunberg) in the Philippines.

Philippine Agric.Rev., Manila, Vol.XIV,No.1, pp.87-125.

Kerosene emulsion may prove to be a satisfactory method of control, especially for the nymphs.

1765
1899. d'Ultra, G.

Extinccao de alguns parasitas do cafeeiro.

Boletim do Inst.Agronom.de Sao Paulo,Vol.10, No.11-12,pp.778-785.

A mixture of $CuSO_4$ 1 kg, kerosene 5 liters and water 500 liters is recommended in Guatemala for Dactylopimus destructor & Lecanium nigrum on coffee trees.

1766
1907. d'Ultra, Gustavo.

Os pulgoes laniferos das macieiras.

Revista Agricola Sao Paulo,Vol.12,No.138, pp.243-249.

Kerosene emulsion is recommended for woolly aphis on apple trees in Brazil.

1767
1923. Urbahns, T.D.

Insect pest control.

Mthly.Bull.Cal.Dept.Agric., 12, No.7-12,pp. 359-363.

Field tests show that one thoro application of winter spray with a good grade of heavy miscible oil will kill the young and half-grown scales, which comprise practically all of the living forms during the winter months.

1768
1911. Urich, F. W.

The Cacao thrips.

Dept.Agr.Trinidad,Bul.67, 17 pp.

The R & H formula is given. For use, dilute 1 - 15. Scalecide may also be used.

1769
1915. Urich, F. W.

Insects affecting the coconut palm in Trinidad.

Bull.Dept.Agric.,Trinidad,and Tobago,Port of Spain, Vol. XIV, No. 6, pp.200-203.

Burnt palm trees should be treated with crude oil for the bearded weevil and shot hole borers.

1770
1918. Urich, F. W.

Thrips, black ants, and other insect pests of cacao in Grenada with a note on coconut disease.

Rept.presented to the govt.of Grenada, Trinidad, 1918, 23 pp.

After cleaning the trees of the black ant nests crude petroleum should be applied to the spots.

1771
1918. Urich, F. W.

The black-eye pea weevil.

Bull.Dept.Agric. Trinidad & Tobago, Port of Spain, Vol.XVII,No.1,pp.14-16.

Sprinkling and rubbing peas with kerosene oil will not prevent infection.

1772
1911. Van Buren, B.D. & Huested, P. L.

Important orchard pests and spray formulae.

N.Y.Dept.Agr.Bul.24, pp.477-491.

The R & H formula for making kerosene or petroleum emulsion is given.

1773

[illegible] Van der Merwe, [illegible]

The Citrus Psylla.

Jl. Dept. Agric. Union S. Africa, Vol. VII, No. 2, pp.135-141.

The eggs of psylla were not stopped from hatching by being dipped in kerosene emulsion. Repeated spraying with miscible oils will cause the fall of leaves.

1774

190-. Van Dine, D. L.

Insecticides for use in Hawaii.

Hawaii Agr.Expt.Sta.Bul.3,21pp.

The R & H formula for making kerosene emulsion is given. Also Cook's kerosene emulsion.

1775

1904. Van Dine, D. L.

A sugar-caneleafhopper in Hawaii.

Hawaii.Agr.Expt.Sta.Bul.5,29 pp.

Kerosene emulsion has a limited use for spraying sugar cane. The emulsion is prepared by adding 5 gals. of oil (distillate 28% gravity) and 1-1/2 lbs. of whale oil soap to 5 gals. of boiling water and churning to a creamy mass. This is diluted with 15 to 20 parts of water before applying to the cane.

1776

1904. Van Dine, D. L.

Mosquitoes in Hawaii.

Hawaiian Agr.Expt.Sta.Bul.6, 30 pp.

Bodies of water that can not be drained or otherwise done away with, should be treated with kerosene to prevent the larvae from obtaining the necessary air.

1777

1909. Van Dine, D. L.

Report of the entomologist.

Hawaii Agr.Expt.Sta.Rpt.1908,pp.17-41.

Kerosene emulsion is recommended for the pineapple scale.

1778

1909. Van Hall, A. E. - de Jonge.

Geneesmiddelen tegen planten-ziekten.

Suriname Departement Van den Landbouw. Bull. 22,11 pp.

Cook's and R & H formulas for kerosene emulsion are given.

1779

1916. Van Zwaluwenburg, R. H.

Report of the Entomologist.

Rept. Porto Rico Agr. Exp.Sta. 1915,pp 42-45

1-10 kerosene emulsion will keep the lacewing, common on egg plant from becoming troublesome.

1780

1910 - Vickery, R. A.

Contributions to a knowledge of the corn root-aphis.

USDA Bur. of Ent. Bul. 85; Part VI; pp; 97-118.

Kerosene was tried as a repellent.

1781

1917. Vickery, R. K.

The selection of petroleum insecticides.

Mthly.Bull.Cal.State Commiss. Hortic., Sacramento, Vol.VI, No. 10, pp.384-387.

There are a number of useful tests that may be applied to insecticides prepared from petroleum in its various forms. These may be divided into three classes (1) Tests to determine the killing power of the oil with reference to the insect for which it is intended. (2) Tests to determine what injury the oil may do to plants with which it may come in contact. (This point is not considered in this paper).
(3) Tests to determine the efficiency of various methods of applying the oil to the pest, emulsions, etc.

The work of Shafer, published in technical bulletins Nos. 11 and 21, of the Mich.Agr.Expt.Sta., is reviewed as to the effects of oils on insects. Vickery repeating Shafers work, came to slightly different conclusions. Silk worm larvae were used and the reactions were speeded up by the use of liquid air.

The conclusion was drawn that insects that had been exposed to the effects of petroleum vapor showed a marked increase in the oxidising enzymes rather than a reduction of the reducing enzymes.

From the practical point of view Shafer's work showed that the oil must have a due proportion of volatile frantions. The best killing oil may be a

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Vickery, Mthly.Bull.Cal.State.Commiss.No.10. (Cont'd.)

blend of light frantion and a heavy lubricating oil.

The so-called "penetration" of an oil spray depends on the capillarity of the oil.

Because of the complex composition of oils it is difficult to determine their true toxicity. Petroleum is a complex mixture of many compounds and series of compounds. It is unknown which ingredient or ingredients of the oil contain the toxic qualities. It is well to know which groups of oils are most effective. Out of many possibilities the following short list will give examples of different oil types that can be compared.

1. Pennsylvania paraffin base crude oil.
2. Calif. asphalt base crude oil.
3. " paraffin-asphalt base crude oil.
4. Penn. kerosene.
5. Calif. kerosene.
6. Crude oil with sulphur compounds.
7. " " low in sulphur compds.
8. " " with nitrogen compds.
9. " " low in nitrogen compds.
10. " " with unsaturated compds.present.
11. " " " " removed.
12. Stove distillate with cracked products present.
13. " " with cracked products removed.

Field experiments are practical for a comparison of the effectiveness of these different types of oils.

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Vickery, Mthly.Bull.Cal.State Commiss.No.10. (Cont'd).

Any experiments must also consider the effect of oils on the host plants on which these insects live. When plants are involved some method of dilution with water is necessary.

The simplest form of an emulsion is the mechanical mixture of oil and water.

Most emulsions used are more or less permanent in character. This permanence is brought about by the addition of third substance to the oil and water. The simple emulsions in which the drops of oil are merely entangled in the minute particles of some finely divided insoluble substance have been called by Pickering quasi-emulsions. The limoid or calcium hydrate emulsion is a good example.

A true emulsion may be defined as having three components. There must be two non-miscible or partially non-miscible liquids such as oil and water. There is a third component which is called the emulsifier. One liquid occurs in the form of drops and is said to be in the dispersed state. The other is the matrix liquid and is said to be in the dispersing or continuous phase. The function of the emulsifier is to form a layer or pellicle around the drops of the liquid in the dispersed phase to keep these drops from coalescing.

The emulsifier must be colloidally soluble in the dispersing liquid. Soap, the usual emulsifier, is colloidally soluble in water. In making a spray emulsion, the emulsifier is added to the water and then the oil

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Vickery, Mthly.Bull.Cal.State Commiss.No.10.(Cont'd.)

is added gradually. For spraying purposes an emulsion approaches perfection as the drops become smaller and more uniform in size. The application of oil is more even and the injury to the plant is decreased.

Up to a certain limit the addition of more emulsifier has the advantage of decreasing the size of the drops. The minimum size of the drops seems to be a function of the oil.

The so-called "miscible oils" are a commercial preparation in which the emulsifier is held in the oil either by suspension or by colloidal solution.

1782

1920. Vickery, R.K.

Petroleum Insecticides.

Jour Econ. Ent, vol.13, no.6.pp. 44~~9~~-447.

See Supplementary abstract

1783
1917 - Vinal, Stuart C.
The Greenhouse red spider attacking cucumbers and methods of control.
Mass.Agr.Expt.Sta. Bul. 179, pp.153-182.
Arlington Oil: This is a chemically miscible oil containing approximately 90% petroleum oil. Used at the rate of 1 to 50 water, it was effective in controlling aphids and thrips, but killed only 50% of the actively feeding mites. At the above dilutions the foliage of cucumber was severely injured and even when diluted to 1-100, injury still occurred.

Arlington Oil and Black-leaf 40 formula:
1 part oil to 125 water: black leaf-40, 1 to 2,000 water. This combination is much more active than the ingredients used separately, but is injurious to foliage. Kerosene emulsion is efficient in controlling red spiders, but it is severely injurious to tender foliage.

1784
1905. Vincenheller, W. G.

The cattle tick.

Ark.Agr.Expt.Sta.Bul.90,pp.129-141.

Where only a few cattle are to be handled individual grooming and washing with kerosene emulsion will clear the cattle of ticks.

1785
1903 Volck, W.H.
Spraying with distillates. Calif. Agric. Expt. Sta. Bul. 153, 31 pp.

See Supplementary abstract

1786
1907. Volck, W. H.

The California tussock-moth.

Calif.Agr.Expt.Sta.Bul.183,pp.189-216.

A 5% mechanical mixture of kerosene was harmless to the tussock moth larvae.

1787
1873. W. H. S.

Kerosene for parasites, etc.

The Cultivator and Country Gentleman, Mar.6, 1873. p.155.

Pure kerosene was used on horses, hogs & chickens for lice. No injury resulted from its use and it killed the lice in every case.

1788
1917 - Wade, Otis
The Sycamore lace-bug.

Oklahoma Agr. Exp. Sta. Bul. 116, 16 pp.

Kerosene emulsion is made by the R & H formula, using either laundry or whale oil soap: crude oil may be substituted for kerosene. There was some injury from the use of kerosene. A 10% oil spray killed all of the young of the lace bug and from 80% to 90% of the adults.

1789
1925. Wagner, F.

Insecticide with petroleum base used to kill boll weevil.
Nat. Petroleum News, Vol.17, No.13,117-8.

"Texaco B.Q". a petroleum-base insecticide, is applied as a fine spray at a cost of $3.50 to $4.00 per acre per season. It is very effective in destroying the boll weevil.

1790
1915. Wahl, R. O.

Notes on some common insect pests of the vegetable garden.
Union of South Africa Dept.Agric., Pretoria, Pubn. 14, pp.19-24.
Kerosene emulsion kills the larvae of the small cabbage moth, also Gargoyle red spraying oil emulsion when diluted 1-32. The red spraying oil is recommended for the Bagrada bug when diluted 1-32.

1791
1925 Wakeland, C.

The fruit tree leaf roller: Its control in southern Idaho by the use of oil emulsion sprays. Idaho Agric. Expt. Sta. Bul. 137, 11 p.

See Supplementary abstract

1792
Walden, B. H.
1922. The mealy flatas.
Conn. Agr. Expt. Sta. Bul. 234, pp 189-190.

Spray thoroughly with a contact insecticide such as kerosene emulsion.

1793
1902. Walker, E.

Why apple trees fail.

Ark.Agr.Expt.Sta.Bul.71,p.16.

Trees infested with woolly aphis should be dipped in 10% kerosene emulsion.

1794
1908. Walker, P. H.

Some technical methods of testing miscellaneous supplies.
U.S.D.A.Bur.Chem.Bul.109,48 pp.
Methods for testing lubricating oils are given. Points to be determined were specific gravity, flash and fire points, viscosity, ash, reaction of oil, action on copper, tarry and suspended matter, cold test, volatility, fatty oils, quantitative determinations, acid number and rosin oil.

1795
1922- Wallace, F. N., & OThers.
Report of the Division of Entomology, 3rd Ann. Rept. Ind. Dept. Conservation, 1920-21, pp. 37-57.

The rose midge is controlled by nightly fumigation with nicotine papers or tobacco stems and by keeping benches covered with tobacco dust. The walks and soil beneath the benches must be sprayed with a strong contact insecticide like kerosene emulsion.

1796
1915. Wallace, M.

Cheese mites.

Agric.Gaz.of N.S.W.Vol.26,No.8,pp.699-700.

The best control is the systematic washing and scrubbing of the shelves, woodwork and walls of the cheese room with an emulsion of soft soap and kerosene.

1797
1917. Walton, C. L.

Some farm insects observed in the Aberystroyth area, 1913-1916.

Ann.App.Biol., Vol.IV, Nos.1 & 2, pp.4-14.

Soaping the seed of root crops in paraffin (kerosene) has proved of benefit for keeping them clear of flea beetles.

1798
1902 - Warburton, C.
Orchard and bush fruits pests and how to combat them.
Jour. Roy. Agr. Soc. England, Vol.63, pp 115-134.

The R & H formula for kerosene emulsion is given.

1799
1906 - Warren, G.F.
Spraying.
N. J.Agr.Expt. Sta. Bul. 194; 60 pp.
Crude petroleum is used undiluted by some growers. It is a powerful scale remedy but dangerous to trees. The essential points in its successful use seem to be: Warmed oil, thoroly agitated. Sprayed with a high pressure and fine nozzle, giving as light an application as possible, and applied as late in the spring as possible. Kerosene is used with a safety by a few men, but is extremely dangerous if not skillfully used. Essential points for its use are: A bright clear day, fine nozzle, high pressure, light application. Kerosene and crude petroleum are both applied with water by means of an oil and water pump.

These pumps are generally unreliable. Soluble oils that give promise of usefulness against scale are treated in Bul. 186. Kerosene limeoid has been used but is only partially successful. The difficulty has been that the mixture separates. See Bul. 178 for preparation. Bordeaux mixture and Paris green have been used with a 10% K-L mixture on trees in foliage in Dela Station, thus combining fungicide, poison and contact insecticide. Kerosene emulsion is made by dissolving $\frac{1}{2}$ lb. soap in 1 gal. hot water, add 2 gals. kerosene and churning thoroly or pumping into itself till a creamy emulsion is formed. For dormant use dilute 3 to 7 times. For plant lice on foliage dilute 15 to 20 times.

1800
1890 - Washburn, F.L.
Entomological Notes.
Ore. Agr. Expt. Sta. Bul. #5, pp. 3-23.

Kerosene used as a contact on the grain beetle killed in 2 minutes. The vapor of kerosene did not kill. Spraying of the empty bins with kerosene and carbon bisulphide is very effective in killing beetles that cling to the sides of the bin.

1801
1892 - Washburn, F.L.
Insects injurious to young fruit trees.
Oregon Agr. Expt. Sta. Bul. 18; 16 pp.
Three ways of making kerosene emulsion are given: (1) The R & H formula; (2) Prof. Cook's formula; (3) Hard soap formula. The hard soap emulsion is made by dissolving ¼ lb. hard soap in 2 quarts boiling water, adding 1 pt. of kerosene and agitating with a force pump. With some soaps the mixture may become lumpy and stringy when cold and sometimes has to be heated before it can be diluted.

1802
1893 - Washburn, F.L.
The Codling Moth and Hop Louse.

Oregon Agr. Expt. Sta. Bul. #25; pp. 1-13
Kerosene emulsion is not a safe insecticide in the hands of hop growers.

1803
1894 - Washburn, F.L.
The pear leaf blister, The clover mite.
Ore. Agr. Expt. Sta. Bul. 33; pp. 9-12 & 12-13.
Kerosene emulsion is recommended in the autumn when the pear leaf blister mite is migrating. It is used diluted 1-7 or 8. For the clover mite on fruit trees spraying with kerosene emulsion with a little suplhur added is recommended.

1804
1902 - Washburn, F. L.
Insects notably injurious in 1902.
Minn. Agr. Expt. Sta. Bul. 77, 74 pp.
Kerosene emulsion formula: Dissolve ½ lb. of soap (soft) or hard soap in 1 gal. of water, boiling it thoroly. When soap is dissolved remove from fire and add 2 gals. of kerosene. This should be pumped vigorously with a force pump. This stock emulsion will keep for many weeks. It was used on the chinch bug, white grubs in lawns, without success. Pure kerosene was used against mosquitoes. Kerosene emulsion 1-12 for melon aphis.

1805
1903 - Washburn, F.L.
Injurious insects of 1903.
Minn. Agr. Expt. Sta. Bul. 84, 184 pp.
Benzine & gasoline may be sprayed into cracks and crevices for bedbugs. Crude petroleum is an oily inflammable liquid, varying in color from very dark brown to greenish tints. The heavier oils are valueble as insecticides. The eastern oils have a paraffin base, western oils an asphalt base. The safety of petroleum as in insecticide depends upon its specific gravity. 43° or above is less likely to injure the trees. This is one of the best scale insect remedies. It should be used on a clear bright sunny day. On perfectly dormant apple trees use 40% emulsion, while on dormant plum trees use 25% emulsion.
Kerosene is used pure and also diluted with water. One part kerosene to 6 water can be used on trees in foliage without injury, while plant lice are killed with a 1-15 or 1-20 dilution. Pure kerosene may be used but is attended with too many uncertainties. Kerosene emulsion is the best form of kerosene mixture. It is made by dissolving ½ lb. hard soap in 1 gallon boiling water and adding 2 gals. kerosene; churn with a spray pump. For plant lice use 1-10 dilution. Some insects will require a stronger dilution. Kerosene milk emulsion is made with 1 gal. sour milk and 2 gals. kerosene. Dilute as in kerosene emulsion. If the milk is sweet add a little vinegar.

1806
1904 - Washburn, F. L.
Injurious Insects of 1904.
Ninth Ann. Rpt. State Ent. Minn. 197 pp.

Kerosene emulsion 1-12 was used against the leaf hoppers but did not permanently affect the adults. The strength was increased to 1-10. This did not injure the trees, nor did it kill the adults. A kerowater spray was tried but could not deliver the amount of oil shown by the indicator. A 10% kerowater mixture appeared to be effective against the adults.

1807
1904 - Washburn, F. L.
~~Injurious Insects of 1904.~~
Minn. Agr. Expt. Sta. Bul. 88, 197 pp.

The kero-water mixture has the advantage over kerosene emulsion as it eliminates the making of the latter and is a saving of time. It is cleaner than the emulsion and easire to handle; 10% oil and 90% water is effective against sucking insects and ordinarily does not injure foliage. It has the difficulty of not delivering the amount of oil for which the machine may be set.

1808
1904 Washburn, F.L.
[Discussion p.25 following a paper by James S. Hine]
U.S.Dept.Agr. Div.Ent. Bul.46, pp.23-25

Kerosene and lard against Horn fly infesting cattle.

1809
1905. Washburn, F. L.

Preliminary report upon work against a destructive leaf hopper (Empoasca mali).

U.S.D.A.Bur.Ent.Bul.52, n.s., pp.43-47.

Kerosene emulsion 1-12 and 1-10 killed the young hoppers but did not hurt the old ones. No injury to the trees was noted. A kerowater pump was tried but it failed to produce the % oil indicated, giving either too little oil or too much.

1810
1906. Washburn, F. L.

The cabbage maggot and other injurious insects of 1906.

Minn.Agr.Expt.Sta.Bul.100. 87 pp.

1 pt. of kerosene was mixed with 2 gals. of sand and placed around the base of cauliflower plants after setting as a repellant. This treatment was fatal to the plants.

1811
1906. Washburn, F. L.

Injurious insects of 1905 in Minnesota.

U.S.D.A.Bur.Ent.Bul.60, p.84-89.

Kerowater 1-15 was used with success on the leaf hopper.

1812
1907? Washburn, F.L.

U.S.Dept.Agr. Bur.Ent. Bul. 67, p. 17

Kerosene against Little Red Ants in houses.

1813
1908. Washburn, F. L.

The apple leaf hopper and other injurious insects of 1907 and 1908.

Minn.Agr.Expt.Sta.Bul.112, pp.145-254.

The R & H kerosene emulsion formula was not effective on the leaf hopper.

1814
1912. Washburn, F. L.

Grasshopper work in Minnesota during the season of 1911.
Jour.Econ.Ent.Vol.II, No.2, pp.111-118.

Oil does not kill the grasshoppers with long wings, since the wings protect the spiracles from the oil.

1815
1898. Waters, G.

Orchard notes for February.

Agric. Gaz. of N.S.W. Vol.9, No.1, p.108-9.

The R & H formula for scale insect. Dilute 1-10.

1816
1922. Waterston, J.

A contribution to the knowledge of the bionomics of sand-flies.
Ann. Trop. Med. & Parasit. Liverpool, Vol.XVI, No.1, pp.69-92.
Ordinary kerosene may be used as a repellant for the flies.

1817
1912 - Watson, J. R.
Tomato Insects.
Florida Agric. Expt.Sta. Bul. 112, pp. 21-39.
Kerosene emulsion for tomato aphis is made by dissolving 1/2 lb. hard soap in 1 gal. soft water and boiling. Then add 2 gals. of kerosene and churn to an emulsion. A dilution of 1-10 will not burn the plants. For flea beetles, kerosene emulsion may be used around the roots to destroy the larvae and eggs.

1818
1914 - Watson, J.R.

White Fly Control - 1914.

Florida Agr. Exp. Sta. Bul. 123, pp. 3 - 23.

Yothers' formula No. 1: Whale-oil soap 8 lbs., (or 1 gal) paraffin oil (24 or 28 Be) 2 gals., water 1 gal. This is made by adding the oil to the soap, stirring thoroly and then adding the water. For spraying orange trees use 1 gal. of the stock mixture to 50 gals. water. This gives 1% oil dilution. Petroleum fuel oil, crude oil, distillate, or gas oil may be used instead of the paraffin oil. These will have to be used at twice the strength to kill the insects.

1819
1915 - Watson, J.R.

The Woolly Whitefly

Univ. Florida, Agr.Expt.Sta. Bul. 126, pp. 81-102.

Yothers' formula No. 1 for the cold stir emulsion is given and recommended for the woolly white fly. When ready to spray dilute the emulsion to make 200 gals.

1820
1917 -Watson, J. R.

Florida Truck & Garden Insects.

Univ. Florida Agr. Expt. Sta. Bul. 134, pp. 35-127.

Kerosene emulsion is a standard remedy for large insects as well as small ones, but unless made and applied carefully it is likely to scorch tender foliage. Stock emulsions: Hard soap 1/2 lb., Hot water (soft) 1 gal; kerosene 2 gals., It is emulsified in the usual way. For spraying dormant trees and shrubs use 1 part to 5 to 7 parts water. for ordinary growing plants dilute 1 10 to 15, depending on the insect to be killed. The weakest solution given will kill plant lice. Kerosene emulsion may be used for bean-leaf hopper but there is some danger of burning. Harlequin cabbage bugs can be killed by kerosene emulsion also the young of the pumpkin bug.

1821
1918- Watson, J. R.

Insects of a Citrus Grove.

Univ. Florida Agr.Expt.Sta.Bul. 148, pp. 165-267.

White fly may be controlled by spraying with a miscible oil. In place of the original formula of 8 lbs. whale oil soap, paraffin oil, 2 gals., and water 1 gal. a formula with less soap has been used. Paraffin oil 2 gals., water 1 gal., soap 2 lbs. this formula must be heated to the boiling point and emulsified. Spraying should be done in late April or May. Three sprayings each year should usually suffice to control the whiteflies and also the purple and long scale.

1822
1919 - Watson, J. R.

Florida Truck and Garden Insects.

Univ. Florida Agric. Expt.Sta. Bul. 151, pp. 35-127.

A revision of Bulletin 134 of this Station.

1823
1919 - Watson, J. R.

Controlling Poultry Lice.

Florida Agric. Expt. Station, Press Bul. 315, 2 pp

A good mixture for killing lice consits of 2 parts gasoline mixed with 1 part crude carbolic acid. Plaster of paris is then worked in until all the liquid is absorbed. This is allowed to dry and is rubbed into the fowls. To destroy lice in the poultry house, spray with kerosene, or better, crude petroleum; make three applications about a week apart.

1824
1922 - Watson, J. R.

The Flower Thrips.

Florida Agric. Expt. Sta. Bull. 162., pp. 27-51.

Any of the oil emulsions used for whitefly and purple scale will kill thrips but they are not safe to use on any fruit blossoms. Picking and dropping the blossoms into a kerosene-water solution will clear up infestations on roses.

1825
1923 - Watson, J. R.

Report of the Entomologist.

Florida Agric. Expt. Sta. Rept. 1922-23, pp.103-113.

Control of mealybugs was attempted with oil emulsions. The results were undatisfactory. The oil did not penetrate the mass of mealybugs between the fruits in clusters with sufficient thoroness to do effective work. These oil emulsion sprays did not kill over 50%. Kerosene emulsion 1-15 gave satisfactory results.

[illegible]
[illegible] - Watts, [illegible]

The Hog Louse.

Univ. Tenn. Agric. Expt. Sta. Bull. [illegible]; 16 [illegible].

Crude oil is one of the best [illegible] for the hog louse and can be applied as [illegible]. [illegible] mixed with an equal part [illegible] cotton seed oil, [illegible] or other [illegible] oil, is [illegible].

1827
1897. Waugh, F. A.

A report on the occurrence of the cabbage root maggot.

Vermont Agr.Expt.Sta.Rpt.1896-97.pp.116-119.

The maggots may be killed by 2 or 3 treatments of kerosene emulsion , which should be applied to the roots of the plants after the removal of some of the earth.

1828
1902? Webb, W.

U.S.Dept.Agr. Bur.Ent. Bul. 40, p. 42

Crude & Refined Oil against San Jose Scale on peaches, plums, pears and apples.

Kerosene emulsion against San Jose Scale infesting plum trees.

1829
1903. Webb, W.

Kerosene and lime.

Rural New Yorker, Vol.LXVI, No.2809, p.820.

Kerosene, lime and water was first used for spraying [illegible]. The oil and lime mixture was used on [illegible] which had been infested with scale. The trees had previously been treated with crude oil, so no difference could be found between trees treated with the lime [illegible] those with no treatment. The mixture made with 10 lbs. of lime and 5 gals. of kerosene diluted to 2[illegible] gals. did not injure foliage.

1830
1896. Webster, F. M.

Insects of the year in Ohio.

U.S.D.A.Div.Ent.Bul.6,n.s.,pp.66-71.

Kerosene emulsion can not be used for the grape root worm. Undiluted kerosene was used with success in two orchards infested with San Jose scale.

[illegible]
1831

[illegible]

1832

[illegible]

1897 - Webster , F. M.

1833

The San Jose scale in Ohio

[illegible]. Agr. Exp. Sta. Bul. 81, pp. 17[illegible]-21[illegible]

[illegible] with undiluted kerosene showed that it could not be used safely on peach trees or on plum trees of tender varieties, but if applied lightly with a brush on hardy plums, pears and apples, it can be safely used. The kerosene killed the scale completely.

1834
1897 - Webster, F. M.

The periodical cicada, or so called seventeen year locust in Ohio.

[illegible] Agr. Exp. Sta. Bul. 87, pp 37-68.

Kerosene emulsion and pyrethrum mixed with [illegible] the newly emerged adults.

1835
1898. Webster, F. M.

Entomology. Warning in regard to the use of pure kerosene on trees.
Ohio Farmer, Vol.XCIII, No.19, p.383, May 12, 1898.
A few trees should be sprayed with pure kerosene first before spraying an entire orchard. In some cases injury has resulted from its use and in other cases no injury has resulted.

1836
1898 - Webster, F.M.
The chinch bug.

USDA Div. Ent. Bul. 15, n.s. 82. pp.

Kerosene emulsion made by the R & H formula is the most effective substance for the chinch bug. When the bugs have begun an invasion of a field of corn spraying the first few rows will kill the bugs clustered on the rows and stop the invasion long enough to use other remedies.

1837
1899 - Webster, F. M.
The San Jose scale problem in Ohio in 1898.

Ohio Agr. Exp. Sta. Bul. 103, pp. 135-193

Diluted kerosene can be used in summer for destroying the young scale, but is not effective against full grown scale during the winter. Experiments with pure kerosene on various kinds of fruit trees gave various results. Peach and plum trees were killed by fall spraying; pear and apple trees were unhurt. The danger to the trees was too great to warrant the general use of undiluted kerosene.

1838
Webster, F. M.
1899. Some recent developments in the San Jose Scale problem in Ohio.
Soc. Prom. Agr. Sci. Proc. 19th Ann. Meeting for 1898 pp 112-119.

See Supplementary abstract

1839
1901. Webster, F. M.

Report of the committee on entomology.
Ann.Rept.Ohio State Hort.Soc. for 1900, p.1-2.
The results of spraying with crude petroleum have been both good and bad in the hands of the same man. A 10 to 20% mixture with water constitutes a fairly successful summer wash and destroys the young scale.

1840
1901. Webster, F. M.

Report of the Committee on Entomology.

Ohio Hort.Soc.Rept.1901, pp.117-140.

A percentage of crude petroleum from 20 to 35% seems to be the best for use on the scale. A larger per cent will cause injury to the trees and a lower per cent will not kill enough of the scale.

1841
1901. Webster, F. M.

Results of some applications of crude petroleum to orchard trees.
31st Ann.Rept.Ent.Soc.Ontario, p. 59-61.
Crude oil was used on seedling apple trees with varying results. In some cases injury resulted and in others no apparent injury was noted. The use of the crude petroleum is not recommended.

1842
1902. Webster, F. M.

Report of the committee on entomology.
35 Ann.Rept.Ohio State Hort.Soc.1901, pp.117-140.
Anything below a 20% mechanical mixture of crude petroleum is not sufficient for controlling the San Jose scale. Between 20 and 35% will give the best results, if carefully applied. Injury resulted from the use of 25% on peaches.

1843
1903. Webster, F. M.

The results of applying crude petroleum to peach trees in Ohio to suppress the San Jose scale.
Proc.23rd.Meet.Soc.Prom.Agr.Sci.1902, p.119-140.
The results from spraying crude petroleum were both good and bad. The margin between success and failure is very narrow. To spray a tree with crude petroleum without injuring it is not difficult; to spray a tree and destroy the scale is also not difficult; but to do both at the same time is exceedingly difficult.

1844
1907 - Webster, F. M.
The Chinch Bug.

USDA. Bur. of Ent. Bul. 69; 95 pp.

Kerosene emulsion made by the R & H formula is effective in stopping an invasion of the chinch bugs from one field to the other. The bugs are destroyed as they gather on the first few rows of corn.

1845
1912. Webster, F. M.

The clover mite.

U.S.D.A.Bur.Ent.Circ.158, 5 pp.

The eggs can be destroyed on the trunks of trees by the use of strong kerosene emulsion.

1846
1915. Webster, F. M.

The chinch bug.

U.S.D.A. Farmers' Bul. 657, 28 pp.

The R & H formula for kerosene emulsion is given for use against the chinch bug.

1847
1912 - Webster, F.M., & Phillips, W.J.

The spring grain-aphis or green bug.

USDA Bur. Ent. Bul. 110; 153 pp.

Kerosene emulsion was applied at 8 and 10% strength and at the end of 9 days no green bugs could be found. No injury to the grass resulted.

1848
1910. Webster, R. L.

The apple leaf hopper.

Iowa Agr.Expt.Sta.Bul.111, 32 pp.

The following formula was used for dipping nursery stock: 4 lbs.whale oil soap, 3 bars white laundry soap, 1 bushel tobacco stems, 1/2 gal. kerosene, 50 gals. water. The dipping was effective when thoroughly done.

1849
1910. Webster, R.L.

Insects of the Year in Iowa.
Jour. Econ. Ent., vol. 2, pp. 212-214.

In the discussion following this article Mr. Slingerland mentions the need for accuracy in making up kerosene emulsion. Other discussions followed.

1850
1912. Webster, R. L.

The pear slug.

Iowa Agr.Expt.Sta.Bul.130, pp.165-193.

The R & H formula is given. A 10% solution was effective on the slug.

1851
1915 - Webster, R.L.
Potato Insects.
Iowa St. Coll.Agr.Expt.Sta.Bul. 155, pp. 359-420.
Kerosene emulsion is made with 2 gals. of kerosene, 1 gal. water and ½ lb. soap. The soap is dissolved in boiling water and is then churned with the kerosene. The stock is then diluted to the destired strength.

1852
1917 - Webster, R.L.
The Box Elder Aphid.
Iowa State Coll.Agri.Expt.Sta. Bul. 173.
pp. 95-119.

Kerosene emulsion is made by dissolving ½ lb. hard soap in 1 gal. of boiling water and is then churned with 2 gals. of kerosene until they two are emulsified into a white, creamy mixture. A 1-9 dilution is recommended for the lice by spraying in May.

1853
1889. Weed, C. M.

Experiments with remedies for the striped cucumber beetle.

Ohio Agr.Expt.Sta.Bul.13, pp.143-148.

Kerosene had no effect as a repellant for the beetle.

1854
1892. Weed, C. M.

Report of the entomologist.

N. Hampshire Agr.Expt.Sta.Report for 1890-1891, pp.242-263.

The B & H formula and Cook's soft soap and hard soap formulas are given.

1855
1894 - Weed, C.M.

Some dangerous fruit insects.
New Hampshire Agr. Expt. Sta. Bul. 23, 22 pp.

The pear psylla can be destroyed by spraying in the spring after the eggs hatch out and before first brood matures, with kerosene emulsion diluted with 25 parts water. The young San Jose scale are easily destroyed by spraying with kerosene emulsion.

1856
1895 - Weed, C.M.

Remedies for the horn fly.
New Hampshire Coll. Agr. Expt. Sta. Bul. 28, 4 pp.

A combination of kerosene emulsion and tobacco decoction was tried. The emulsion was made by adding 2 Gals. of kerosene to 1 gal. of a solution made by dissolving ½ lb. hard soap in 1 gal. of water boiling hot and churning the mixture by means of a force pump. This is diluted 1-9 before using. There is then added 1 gal. of a decoction made by boiling 1 lb. of strong tobacco in 1 gallon of water. This was sprayed on the cattle by means of a force pump. Whenever the liquid came in contact with the flies it killed them instantly and it acted as a repellent for two or three days.

1857
1896 - Weed, C.M.

The army worm in New Hampshire.
New Hampshire Coll. Agr.Expt. Sta. Bul. 39, pp. 63-75.

The worms may be destroyed by spraying with a strong kerosene emulsion. This is made by dissolving ½ lb. hard soap in 1 gal. of boiling water; add 2 gals. of kerosene and churning the mixture with a force pump. The emulsion should be diluted before useing with 5 or 6 parts water to 1 quart of emulsion. Soft or rain water should be used in diluting. If this cannot be obtained add a little lye or bicarbonate of soda.

1858
1898. Weed, C. M.

Department of entomology.

New Hampshire Agr.Expt.Sta.10th Ann.Rept., pp.199-215.

One teaspoonful of kerosene to a nest was found a satisfactory way of killing the partially grown larvae of the American tent caterpillar.

1859
1898. Weed, C. M.

Notes on tent caterpillars.

U.S.D.A.Div.Ent.Bul.17,n.s.,pp.76-78.

The careful use of a very small amount of kerosent in wetting the silk of the nest was found a satisfactory way or killing the partially grown caterpillars.

1860
1904 - Weed, C.M.

The pernicious or San Jose scale insect in New Hampshire.
New Hampshire Coll. Agr. Expt. Sta. Bul. 109, pp.73-83

Trees infested with the scale were sprayed with undiluted kerosene. The results obtained were not satisfactory, only part of the insects being killed.

1861
1902 - Weed, C.M. & Conradi, A.F.

The Squash Bug.
New Hampshire Coll. Agr. Expt.Sta. Bul. 89, pp. 13-28.

An 8% mixture of kerowater that will kill the bugs is fatal to the tender squash plants. A mixture having a typical kerosene odor (about 2%) when sprayed on the ground and plant will cause the bugs which are concealed to come forth and try to escape from the odor. They can be easily picked up to make sure of the destruction of the small nymphs spray the ground with an 8% kerowater mixture.

1862
1903 - Weed, C.M., & Conradi, A.F.

The white-fly of greenhouses.
New Hampshire Coll. Agr. Expt. Sta.Bul. 100; pp. 47-52.

The adults of white flies are very easily killed by a mechanical mixture of kerosene and water, with 5% kerosene. The extent to which kerowater spray can be used to destroy nymphs depends upon the plants attacked.

1863
1891? Weed, H.E.

Insect Life, Vol.4, Nos. 1 & 2, p. 33

Kerosene & Pyrethrum against Harlequin Cabbage Bug affecting cabbage.

1864
1891 - Weed, H. E.

Injurious Insects.
Miss. Agr.Expt. Sta. Bul. 14, 40 pp.

Kerosene was applied to screw worms. It acts as an irritant when applied to the surface of a fresh wound. It causes the maggots to let go, and when used the wound should be washed out at once to destroy the irritant effect of the oil. Formula for Kerosene Emulsion Dissolve 1 qt. soft soap or ½ lb. hard soap in 2 qts boiling water; add 1 pt. kerosene, stir until permanently mixed. For use it should be diluted 1-12 or 15

At this strength it will not injure foliage and will destroy any insect it touches. This is an effective remedy for plant lice, ~~and~~ bark lice, tarnished plant bugs and many other insects which suck the juices rather than eat the foliage.

1865
1892 - Weed, H. E.

Insects injurious to the cabbage.
Miss. Agric. Expt. Sta., Bul. 21, 16 pp.

Kerosene emulsion is an excellent remedy for all cabbage insects, but it is not best to apply it to plants which have formed heads, owing to danger of tainting. It should be applied directly to the insects as it kills by irritation and not by poisoning.

1866
1893 - Weed, H. E.

Insecticides and their Application.
Miss. Agr. Expt. Sta. Bul. 27; 24 pp.

Kerosene is the most useful of the external class of insecticides, but cannot be applied in a pure state, owing to the fact that it damages the foliage. It is made into an emulsion by first mixing with soap and then diluting with water to any strength ~~andxth~~ desired, which is best from 1-10 or 1-15. It can also be made by mixing 2 parts kerosene with one part sour milk and then diluting . Kerosene and water mixture is described and its advantages over the emulsion given. The Peerless spray pump is adapted for this mixture.

1867
1894. Weed, H. E.

Some experience with mosquitoes.

Insect Life,Vol.VII.No.2,pp.212-213.

Kerosene placed on the water of water tanks entirely destroyed all mosquitoes.

1868
1894 - Weed, H.E.

The Horn Fly.
Miss.Agr.Expt.Sta.Bul. 28, 8 pp.

The best application to kill the horn flies is kerosene emulsion. The milk emulsion was tried in 1892. 1 part sour milk and 2 parts kerosene was emulsified and then diluted with 12 to 15 parts of water. This was applied to the cows at milking by means of a knapsack sprayer. The emulsion was tried in 1893 but not ~~as~~ with as good results as in the previous year.

1869
1894 - Weed, H. E.

A Kerosene attachment for knapsack pumps.
Miss.Agr.Expt.Sta.Bul.30,pp.35-38.

The kerosene is placed in a separate tank which is attached to the back of the main tank and holds 1¼ gals., A hose connection is used and there are two ball valves at the bottom of the pump cylinder. This mechanical ~~device~~ mixture appears to do all the work of a kerosene emulsion. This attachment is applicable to all the knapsack pumps of the Galloway type. It can be used for many purposes where a mechanical mixture of two liquids is wanted. Good results have been obtained when spraying has been done with the attachment.

1870
1894 - Weed, H. E

A new kerosene attachment for knapsack sprayer
Miss.Agr.Expt.Sta. Bul. 32, p. 56-8.

The kerosene is placed in a separate tank. A brass pipe connects the kerosene tank with the bottom of the pump in the center of the main tank, and a check valve is placed in the kerosene pipe just inside the main tank, with a second value thru' which the water passes, at right angles to this. These check valves permit the passage of the kerosene and the water into the pump, but prevent any mixture of the liquids except while pumping A stop cock is placed between the

the two tanks and attached to it is a rod bent around to
the side of the main tank where it fits into notches on a
guage. When the rod is placed at the bottom notch
the stopcock is closed and when at the top it is open
where equal parts of water and kerosene are used.
The notches are marked to indicate the proposition
of kerosene being used. The mixture takes place partially in the pump but principally inthe nozzle.

1871
1895. Weed, H. E.

Kerosene attachment for knapsack spray pump.

Garden & Forest, Vol. VIII, No. 376, p. 186-7.

See Miss. Agr. Expt. Sta. Bul. 32, for abstract.

1872
1895 - Weed, H. E.
Entomological Work.
Miss. Expt. Sta. Rpt. 1895 - pp. 69-78.

See Supplementary abstract

1873
1895. Weed, H. E.

An improved kerosene attachment for knapsack sprayers.
Southern Cultivator, Vol. 53, No. 5, May, 1895.

See Mississippi Agr. Expt. Sta. Bul. 32 for original of this article.

1874 1895 - Weed, H. E.
Some experiments with the knapsack kerosene attachment.
USDA Div. of Ent. Bul. 2, 26-28.

Experiments with the kerosene attachment pump shows that more kerosene must be used to accomplish the same results as would be used in an emulsion. Pyrethrum adds to the toxicity of kerosene when mixed with it. Kerosene and Bordeaux go well together but the Bordeaux does not adhere to the foliage well. A mechanical mixture of kerosene and water can be used at a greater strength on foliage than a kerosene emulsion.

1875
1895 - Weed, HE.

A modification of the kerosene knapsack sprayer.
USDA Div. Ent. Bul. 2. p. 28, (n.s.)
This modification was given in a New Hampshire Bul.

1876
1896. Weed, H. E.

A New way to use kerosene as an insecticide.
So. Cultivator, Vol. LIV, no. 2, p. 59, Feb. 1896.
The kerosene is applied to the bark of a tree and allowed to remain for 10 minutes and then a match is applied at the bottom of the trunk. The kerosene burns off very rapidly, leaving the bark in good condition without injury to the tree in any way. It removes lichens and scale insects.

1877
1905. Weed, H. E.

Some experiences with pulvinaria.

U. S. D. A. Bur. Ent. Bul. 52, pp. 88-91.

A 15% kerosene emulsion killed the greater part of the pulvinaria, but caused considerable injury to the trees. Linden and box elder can stand only 10% emulsion, the maple 12-1/2%.
Kerosene emulsion against Cottony mapel scale infesting maple and other trees (p. 90)

1878
1923. Weigel, Charles A.

Insect enemies of chrysanthemums.

U. S. D. A. Farmers' Bul. 1306, 36 pp.

Kerosene nicotine oleate spray formula.
Stock solution:
Solution 1. Kerosene 1 gal.; oleic acid, 1 pt.
Solution 2. Volatile nicotine 2 pts, water 1 gal.
Solution 1 is prepared by slowly pouring the oleic acid into the kerosene, stirring constantly. In another vessel solution 2 is mixed. Solution 1 is stirred into solution 2, and the mixture is brought to a creamy consistency by rapidly churning it for several minutes. For use against sowbugs, earthworms, millipeds, etc., 1 pt. of stock is diluted to 10 or 12 gals. of water and sprayed on the earth beneath the pots or the soil underneath the benches as well as the walks and wood work. Avoid getting too much of this material on the plants.

1879
1924 - Weigel, C. A. & Broadbent, B. M.

Lubricating oil emulsion as a control for Chrysomphalus aonidum in greenhouses.

Jour. Econ. Ent. Vol. 17, no. 3, pp. 386-389.

One spraying with lubricating oil emulsion (1.33% oil) gives satisfactory control of this scale without injury to hardy ornamental greenhouse plants.

1880
1920 Weigel, C. A. and Chambers E. L.
The Strawberry root-worm injuring Roses in Greenhouses.

Jour. Econ. Ent. vol. 13, no. 2, pp. 226-232.

A commercial kerosene emulsion (diluted one pt. to 16 pts H_2O) killed the adults but seriously injured the plants.

1923. Weigel, C. A. and Doucette, C. F.
1881
Control of the strawberry root-worm in Commercial rosehouses.

Jour. Econ. Ent. vol. 16, no. 3, pp. 283-288

Beds were heavily watered and the surface of the pools and puddles was filmed with kerosene-nicotine oleate (1 pt. of stock solution to 4 gal of water).

1882
1923. Weigel, C. A. & Doucette, C. F.

U. S. D. A. Farmers' Bul. 1344, 14 pp.

Kerosene nicotine oleate spray is used for filling the surface of pools after syringing the plants with water. The beetles are killed as they swim through the water. The kerosene-nicotine-oleate formula is given in Farmers' Bulletin 1306.

Title. The strawberry rootworm as an enemy of the greenhouse rose.

1883
1923. Weigel, C. A. & Sasscer, E. R.

Insects injurious to ornamental greenhouse plants.
U. S. D. A. Farmers' Bul. 1362, 80 pp.

The kerosene nicotine oleate formula, same as in Farmers' Bul. 1306, is given; also the R & H formula for making kerosene emulsion.

1915. Weiss, H. B.
1884
Unusual nursery insects.

N. J. Dept. Agric. Bur. Statistics & Inspection, Circ. 24, 13 pp.

The iris leaf miner may be killed with a spray of 8% kerosene emulsion.

1885
1918/ Weiss, H. B. & Dickerson, E. L.

The European mole cricket, Gryllotalpa gryllotalpa L., an introduced insect pest.
Jl. N. Y. Entom. Soc., Vol. XXVI, No. 1, pp. 18-23.
A number of remedies have been suggested (Petroleum and a 25% petroleum emulsion injected into the burrows).

1886
1914. Weldon, G. P.

Miscible oil spray for fruit tree leaf roller.

Mo. Bul. Com. Hort. Calif. Vol. 3, No. 7, pp. 285-6.

In small experiments miscible oils at strength of 1-15 to 1-24 prevented fruit-tree leaf-roller eggs from hatching.

1917 - Wenholz, H.
1887 The care of seed maize.

Agric. Gaz. N. S. W., Vol. XXVIII, Part 4, pp 229-243

Kerosene has been used as a remedy for weevil, but has also been found to kill the germ of the grain.

1888
[illegible]. [illegible], [illegible]

The cocoanut, its culture and uses.

Philippine Agric.Review, Vol.XI, No.1, pp.5-57.

The R & H formula for making kerosene emulsion is given.

1889
[illegible]. Whitcomb, W.D.

A new formula for making lubricating oil emulsions.

Jour. Econ. Ent. vol 1[illegible], no. 1 [illegible]

See Supplementary abstract

1890
1892. Wickham, H. F.

An early use of kerosene.

Insect Life, Vol.IV, Nos.9 & 10, p.332-3.

A quotation from Zoologist (Newman's) August 1868, p.1339. "The petroleum was mixed with water, in the proportions of 1 to 1/2 oz. to 1 pt. of water. This was effective for the larvae of cockchafers. An application was said to rid animals of parasites".

1891
1901. Wickson, E. J.

Crude oil or distillate spray.

Pacific Rural Press, Vol.LXI, No.4, p.51, Jany.26, 1901.

The following formula is given: 5 gals.untreated 28° distillate; 5 gals.boiling water; 1-1/2 lbs. whale oil soap. This is emulsified by pumping. Diluted 1-10 on deciduous trees; on citrus trees dilute 1-14.

1892
1903. Wickson, E. J.

Distillate emulsion for woolly aphis.

Pacific Rural Press, Vol.LXV, No.4, 24 Jan.1903, p.50.

Distillate emulsion and kerosene emulsion are both good for killing the woolly aphis as it collects in masses on the branches during the summer time.

1893
1903. Wickson, E. J.

Leaf injury by distillate spraying.

Pacific Rural Press, Vol.LXVI, No.11, Sept. 12, 1903, p.161.

This article was taken from Calif.Bul.153 by W.H. Volck.

1894
Wilcox, E. M.

Notes on troublesome insects.

Oklahoma Agr. Exp. Sta. Rpt. 190[illegible]-[illegible]01. 116.

The melon plant louse can be destroyed [illegible] spraying with kerosene emulsion.

1895
1906. Wilcox, E. V.

Some results of experiment station work with insecticides.

U.S.D.A.Office Expt.Stas.Rept.1905, pp.239-280.

A resume of the experimental work on petroleum insecticides is given. The results of experiments from the use of kerosene and crude oil diluted and mixed with other substances are very much at variance. The confusing results have led the experiment station to recommend that crude oils and kerosene pure or in mixtures with water be applied with great caution.

1896
[illegible]. Wilcox, E.V.

Some results of experiment station work with insecticides.

U.S.D.A.Ann.Rept.Office of Expt.Stations for [illegible], pp.23[illegible]-280.

The results of work on petroleum oils from different stations are taken from Station Bulletins. [illegible] Sta.Bul.153, Connecticut State Sta.Buls. [illegible]

1897
Willaume, Ferrand
1925. Contribution to the study of insecticide mixtures with a base of insoluble oil.
Revue de Pathologie Végétable et Entomologie Agricole. Vol. XII, No. 3, pp. 225-237.

See Supplementary abstract

1898
[illegible]

[illegible] pp 1[illegible]1-177

[illegible] very [illegible] of [illegible] but this [illegible] a 5% emulsion [illegible]

1899
1916. Willcocks, F. C.

Some notes on the mealy plum aphid, Hyalopterus pruni, F.

Bul.Soc. Ent.d'Egypte, Cairo, Annee IX, Part 2, April June, pp.33-37.

Paraffin emulsion is effective against this aphid.

1900
1921. Williams, C. B.

Report on the froghopper blight of sugar-cane in Trinidad.

Memoirs Dept.Agric.Trinidad & Tobago, Trinidad, No. 1, 170 pp.

Kerosene emulsion has been recommended but no trials were made.

1901
1922 - Williams, C. G.

The European Red Mite.

41st Ann. Rept. of the Ohio Agric. Expt. Sta. for the year ending June 30, 1922.

Miscible oil applied in the spring is effective in destroying over-wintering eggs, whereas lime sulphur has little beneficial effect. Both have considerable residual effect in preventing newly hatched mites from becoming established.

1902
1922. Williams, R. O.

Cacao Cultivation in Grenada.

Bull.Dept.Agric.Trinidad & Tobago, Port of Spain, XIX, Pt. 4, pp.215-223.

Crude oil emulsion: 1 lb.soap, 1 gal.crude oil to 10 gals. of water. This was very effective for the mealy bug. No injury was noticed either to the bark or leaves.

1903
1913 Williams, [illegible]

[illegible] infection of pigs.

Jl. Dept. Agric. S. Australia, Vol. XXII, No. 1[illegible], pp [illegible]-71.

Kerosene and lard is recommended for the mange mite on pigs.

1904
1921. Wilson, C. E.

Report of the entomologist.

Rept.Virgin Islands Agric.Expt.Sta.1920, pp.20-35.

The kerosene-fusel oil emulsion was made by dissolving 4.5 lbs.of whale oil soap in 1000 cc.of fusel oil. After the soap had dissolved 8000 cc.of kerosene was added and the whole vigorously stirred until completely emulsified. 1-10 or 15 dilution kills the scales of the Dactylopiinae and coccinae families. The red banded thrips were killed by spraying with a 1-10 solution.

1905
1909. Wilson, H. F.

The peach tree bark-beetle.

U.S.D.A.Bur.Ent.Bul.68, pt.9, pp.91-108.

One-half barrel kerosene emulsion used instead of water to make a good stiff whitewash was the most practicable remedy. The whitewash ~~being~~ the main factor in repelling the beetles.

1906
1915 - Wilson, H.F.
The Fruit-tree leaf-roller.
2nd Bien. Crop and Hort. Rpt. for 1913-14.

Oregon Agr. Expt.Sta. pp. 109-112.

Application of a 10% crude oil emulsion in the spring about the time the buds are opening is recommended for the fruit tree leaf-roller.

1907
1915 - Wilson, H.F., & Moznette, G.F.
The Bud Moth.

Second Biennial Crop pest and Horticultural Report, 1913-1914; Oregon. Agr. Coll. Expt.Sta. pp. 102-103.

Crude oil emulsion 10-100, Distillate oil emulsion 10-100 and Yel-Ros 5-100 were tried on apple trees. As a result of these experiments, oil sprays, as ordinarily used, were not efficient against the bud moth.

1908
1923. Winston, J.R.; Bowman, John J. & Yothers, W.W.

Bordeaux-oil emulsion.
U.S.D.A.Bul.1178, 24 pp.
Bordeaux-oil emulsion, a mixture of 3-3-50 Bordeaux mixture and 1 % oil in the form of an emulsion, is a promising spray material for use in citrus groves. The Bordeaux fraction is as effective against fungi as Bordeaux mixture, and the oil emulsion fraction is as effective against insects as the plain oil emulsion. The Bordeaux mixture is prepared in the usual way and the oil emulsion is made according to the Government formula. The oil emulsion is poured slowly into the diluted Bordeaux mixture while the agitator is running and the agitation is continued while the material is applied. The combination did not burn tender foliage more than the two components applied separately. The Bordeaux-oil emulsion mixed readily with hard and soft water.

1909
1920. Winston, J.R. & Yothers, W.W.

Bordeaux oil emulsion.
Florida Grower, Vol.21, No.3, Jany.17, 1920, p.9.
Bordeaux mixture is prepared in the regular way and oil emulsion is added in quantities that would give 1/2 to 1% oil. All brands of commercial oil emulsion and miscible oils were found to mix readily with Bordeaux mixture. The results of tests have been highly satisfactory and indicate that the mixture will prove very satisfactory in the control of certain fungus diseases. Its use is not followed by injury to the trees or fruit or by abnormal increase of scale insects.

1910
1921. Winston, John R. & Yothers, W.W.

Bordeaux-oil emulsion spray.
Proc.34th Ann.Meeting Fla.State Hort.Soc. 1921, p.145-149.
The regular Bordeaux mixture is made up and the stock oil emulsion is added while the agitator is running. All brands of commercial oil emulsion and miscible oils were tested and were found to combine readily with the Bordeaux mixture. The Bordeaux-oil emulsion adheres to the sprayed plants as well or better than plain Bordeaux. The efficiency of the two sprays is not affected by the mixing.

1911
Woglum, R. S.
1924. The value of sprays compared with fumigation for the resistant black scale.
Calif. Fruit Growers Exchange. Field Dept. Circ. 115, 4p.

See Supplementary abstract

1912
1920. Woglum, R.S. & Borden, A.D.

Control of the Citrophilus mealybugs.
The Calif.Citrograph, Vol.V, No.VII, May, 1920, pp.214 & 230.
The spray adopted was as follows: Soap powder 40 lbs.; distillate, crude 28°, 30° Be. 10 gals, water to make 200 gallons. A good agitator is necessary. After a few inches of water are in the bottom of the tank, the soap powder is sifted in as the tank is being filled, and the agitator is running. The oil is added last before the tank is full. The spraying should take place after the insects have massed on the trunks but before the eggs have hatched.

1913
1922. Woglum, R.S. & Borden, A.D.

Control of the citrophilus mealybug.
U.S.D.A. Bul. 1040, 20 pp.
The trees were banded with burlap to collect the descending mealy bugs. This was a favorite place for them to collect. The bands were removed and sprayed with a distillate soap emulsion, also the trunk and larger limbs of the trees were sprayed. The distillate-soap emulsion was made as follows:
Distillate 28° to 30° Be. 10 gals; soap powder 20 lbs; and water to make 200 gals. A good agitator is necessary in mixing the spray. After a few inches of water are in the bottom of the tank, the soap powder is sifted in as the tank is being filled and the agitator is running. The oil is added last before the tank is full.

1914
1917. Woglum, R.S. & Neuls, J.D.

The common mealy bug and its control in California.
U.S.Dept.Agric.Farmers' Bul.862, 16 pp.

Two sprays are recommended as measuring up to orchard requirements in mealy bug control. Formula for cresolated distillate emulsion is: Distillate (28°Be) 2-3/4 gals, liquor cresolis compositus, U.S.P. 1-3/4 qts; liquid fish oil soap, 1 qt; soap powder (Na_2CO_3 40-60%, NaOH 40-60%) 3 lbs; water to make 100 gals. The soap powder emulsion is made by using 5 gals. distillate emulsion; soap powder emulsion, 10 lbs. ; water to make 100 gals. This formula is more injurious than the cresolated formula.

1915
1918. Wood, W.B. & Selkregg, E.R.

Further notes on <u>Laspeyresia molesta</u>.

Jl.Agric.Research, Vol.13, No.1, pp.59-72.

Miscible oils and nicotine sulphate when applied to the cocoons containing over-wintering larvae and when applied directly to the insects by immersing in the liquid are not effective in killing the larvae.

1916
1923. Woodard, J.S.

Obscure scale on pecan. 16th. Ann. Rept. Comm. Agric. Texas pp.29-31.

See Supplementary abstract

1917
~~1910-Woodbury, C. G.~~
The San Jose Scale.
Some sprays for its control.
Purdue Univ. (Ind) Agr.Expt.Sta.Bul.138, pp.75-86.

Arsenated petroleum emulsion was used on Ben Davis apple. It was diluted 1-100. The mixture is not stable. Trees were little benefited. Crude oil was effective in killing scale. The effectiveness appears to last several seasons, but the material is too dangerous to tree life. Kerosene emulsion 10-20% was used in late spring when the leaves were partly grown. The emulsion was made with tak-apap soap and cold water. Water was added slowly to the soap and kerosene with vigorous agitation. For 10% emulsion 1 gal to 9 gals of water; for 20% 1 gal of emulsions to 4 gals. of water. Young apple leaves were not seriously injured by the 10% solution, and no effect on the scales was apparent. 20% killed the foliage and the scales as well. Pure kerosene is effective, but is too dangerous to be recommended.

1918
1925. Woodman, R. M.

The Physics of spray liquids III On the ease of formation of emulsions.
Journ.Pom.& Hort.Sci.4.No.2,pp.2-95.
Emulsions of oil in water are best made by using the method of intermittent shaking. Oil emulsions are much easier to make at high temperatures and by adding the oil phase gradually and emulsifying between each addition. High viscosity of the aqueous continuous phase has an adverse effect on ease of emulsification. Low surface tension of the continuous phase does not seem to be beneficial. Gelatine and potash soaps are much better emulsifiers than sodium soaps.

1919
1926 Woodman, R.M.

The preparation and conditions of formation of the two possible types of emulsions in the system cresylic acid-gelatin-water. J. Phys. Chem. 30, 658-72. C.A. 20, 2930.

1920
1927 Woodman, R.M.

The solubility of some likely spray substances in solvents containing soap. The preparation of spraying emulsions.

J. Agr. Sci. 17, 44-59.

1921
[illegible]. Woodworth, C.W.

Entomological Notes, Arkansas Agr. Expt. Sta. Bul. 10. pp. [illegible]-13

See Supplementary abstract

1922
1890. Woodworth, C.W.

Rept.of the entomologist.

2nd Ann.Rept.Ark.Agr.Expt.Sta.for 1889,pp.141-188.

The striped cucumber beetle may be easily destroyed by the application of kerosene powder made by mixing 5 to 8 parts of kerosene to 100 of road dust, flour or ashes. The R & H and milk formulas are given for use on the tarnished plant bug.

1923
1894. Woodworth, C.W.

Remedies for plant diseases.

Calif.Agr.Expt.Sta.Rept.1892-94, pp.461-2.

The R & H and sour milk formulae for kerosene emulsion ~~is~~ are given for insects in general.

1924
1896. Woodworth, C.W.

Remedies for insects and fungi.

California Agr. Expt. Sta. Bull. 115, 15 p.

See Supplementary abstract

1925
1898 Woodworth C.W.

Sprays and washes.

Calif. Agr. Expt. Sta. Rpt. 1898, pp. 181-182

See Supplementary abstract

1926
1898. Woodworth, C.W.

Remedies for insects and fungi.

Rpt. Agr. Exp. Sta. Univ. Calif. pp. 213-231

See Supplementary abstract

1927
1910. Woodworth, C.W.

The control of the Argentine ant.

Cal.Agr.Expt.Sta.Bul.207,pp.51-82.

Distillate made into a miscible oil and diluted 1-20 was found to be very effective in destroying the nests. This must be applied liberally and the ground soaked freely.

1928
1908. Worsham, E. L.

Report of the past year's work of the state board of entomology.

Pr.Ga.Hort.Soc.1908, p.73.

See Worsham's Ga.Bul.31 for abst.

1929
1910- Worsham, E. L.

The Cotton Red Spider.
Georgia Agric. Expt. Sta. Bul. 92, 135-141.

Scalecide gave very satisfactory results on the red spider at 1% and 2% dilutions; killing 99% of the spiders as well as the eggs. No injurious effect on cotton was apparent.

1930
1916- Worsham, E. Lee.

Annual Report of the State Entomologist, 1915.
Ga. State Bd. Ent. Bul. 45, 31 pp.

The Lecanium scale is controlled by oil preparations such as kerosene emulsion of scalecide. The oil sprays can be applied when the trees are dormant. 10% kerosene emulsion should be used and Scalecide at 1-10.

1931
1917- Worsham, E. Lee.

19th Ann. Rept. of State Entomologist, 1916.
Georgia State Bd. Ent. Bul. 48, 36. pp.

For the green soldier bugs only strong contact poisons such as a 10% kerosene emulsion can be used with a fair degree of success.

1932
1908 Worsham, E.L. & Chase, W.W.

Report on Experiments for the Control of San Jose Scale, 1907-8
Ga. Sta. Bd. Ent. Circ. 8, 8 pp.

See Supplementary abstract

1933
1910 - Worsham, E. L., & Chase, W. W.

The San Jose Scale and Some Experiments for its Control.
Georgia State Bd. Ent. Bul. 31, 23. pp.

The following materials were tested: Scalecide, Target Brand, Kilpo-Scale, Soluble Petroleum, Schnarr's Compounds, No. 1 & NO. 2, and San-U-Zay. While each oil was applied as a fall and as a spring treatment, it was found in every case that the fall treatment was superior to the spring treatment. The oils were apparently effective in controlling the scale without injury to the trees.

1934
1891. Wyncoop, E. H.

Kerosene emulsion treatment for the rose chafer.
Insect Life,Vol.IV,Nos.1 & 2,p.76.

The R & H kerosene emulsion was very effective on the rose bugs on cherry & peach trees.

1935
1925- Yetter, W.P., Jr.

Codling moth work in Mesa county.
16th Ann. Rept.State Entomologist of Colorado for 1924, Circ. 47- pp. 32-40.

Two oil sprays (Sunoco and Nabob) were used to kill the eggs of the codling moth. More injury was found in the orchards where Sunoco oil was used than when Nabob oil emulsion was used. Where lime-caseinate was employed with the Sunoco oil, less injury was found. From the evidence given oil sprays failed to give satisfactory results against the codling moth eggs. The oil injury was somewhat variable. The injuries consisted of spotting, blotching, scalds, cracks or splits in the skin and poor coloring. The reason for poor results is probably that the oils, which have a paraffin base, are highly volatile and the water soon evaporates, leaving a thin coating of paraffin and some oil which prevents the sticking of any succeeding oil and arsenical sprays, thereby leaving the fruit in a less protected condition.

1936
1911 Yothers, W.W.

Proc. 24th Ann Meeting Florida State Hort. Soc. 19[illegible] 1911, pp. 53-64.

See supplementary abstract

1937
1913. Yothers, W.W.

The effects of oil insecticides on Citrus trees and fruits.

Jour. Econ. Ent. 6, ~~1913~~, No. 2, pp. 161-164.

See supplementary abstract

1938 1913 - Yothers, W..W.

Spraying for white flies in Florida.

USDA..Bur.Ent. Circ. 168; 8 pp.

Emulsions of various heavy oils have been found to give good results against the white fly. While petroleum fuel oil, or "crude oil", and distillate or gas oil will give good results, paraffin oils having a sp. gr. of from 24° to 28° Be have certain qualities which make them superior for use against the white fly. The following formula has given good results. Whale oil soap 8 lbs. or 1 gal; paraffin oil 24o or 28o Be 2 gals. water 1 gal. This is a cold stir emulsion. This formula is added to 200 gals. of water for a 1% spray on oranges.

Formula No. 2.

Water(boiling) 5 gals.; distillate 28° Be. 5 gals., whale oil soap land 1/2 lbs., This is emulsified by means of a pump. For use against the white fly dilute 1-25. This dilution will contain 2% oil.

1939 1918. Yothers, W.W.

Some reasons for spraying to control insect and mite enemies of citrus trees in Florida.

U.S.D.A. Bul. 645, 19 pp.

Paraffin oil emulsion at 1% will kill white flies, scale insects, and rust mites when applied in May. A second spraying with the paraffin oil emulsion at 1% strength from Aug.25 to Oct. 31st is given for white flies and scale insects.

1940 1918. Yothers, W.W.

Spraying for the control of insects and mites attacking citrus trees in Florida.

U.S.D.A.Farmers' Bul.933, 38 pp.

Experiments covering a 10 year period have shown that the best insecticides for controlling white flies and scale insects are those having a base of cheap lubricating oil or what may be called "paraffin oil". Two ways of making the miscible oil emulsions are given: (1) The cold stirred emulsion formula is: Fish oil soap, 8 pounds by weight or 1 gal by measure); (over)

paraffin oil 24° - 28°Be. 2 gals.and 1 gal. of water. The oil is stirred into the soap and then the water is added. The boiled emulsion formula is: Paraffin oil, 2 gals., water 1 gal., fish oil soap or hard soap, 1 lb. All of the ingredients are placed in a container and heated to the boiling point. The material is pumped into itself while still hot. Several proprietary miscible oils have given highly satisfactory results on the white flies and scale insects.

1941 1919. Yothers, W.W.

The woolly white fly in Florida citrus groves.

U.S.D.A.Farmers' Bul.1011, 12 pp.

1942 1921. Yothers, W. W.

Some fundamentals of grove pest control.

Qtrly.Bull.Florida State Plant Bd., Vol.VI,No.1, pp.1-10.

Emulsions made of cheap mineral oils are used for spraying to control white flies and scale insects. For a severe case of purple scale, it may be well to use an emulsion made of an oil with a high viscosity while one with a much lower viscosity would be suitable for the white fly.

1943 1922. Yothers, W.W.

Spraying for the control of insects and mites attacking citrus trees in Florida.

Yothers, W.W. U.S.D.A.Farmers' Bul.933, 44 pp. (Revised).

1944 1923. Yothers, W. W.

Citrus conditions in the Rio Grande Valley and the Satsuma sections of Alabama together with additional notes on San Jose scale situation in Northwestern Arkansas.

Florida Ent.Vol.VII,No.2,pp.17-20.

Heavy oil used for making oil emulsions has given good results on the San Jose scale in Arkansas.

1945 1923. Yothers, W. W.

Cold process oil emulsion.

Citrus Indus.Vol.6,No.3,p.26.

Yothers' cold stir formula is given. The following cold pumped formula is given: 2 gals.oil, 1 gal.water and 2 lbs.fish oil soap. The Missouri station calcium caseinate formula is as follows: 2 gal. oil, 1 gal.water, 8-12 of calcium caseinate. The following kaolin formula is given: 2 gals.of oil, 1 gal. of water, 2-2/3 lbs. Kaolin. The glue formula is as follows: 2 gals.oil, 1 gal.water, 1 lb.glue. The skim milk powder formula is 2 gals.oil, 1 gal.water, 1 lb. skim milk powder.

1946 1925. Yothers, W.W.

Cold process oil emulsions.

Jour Econ. Ent. vol. 18, no. 3, pp. 545-546

See supplementary abstract

1947 1914 - Yothers, M.A.

The peach twig borer, an important enemy of stone fruits.

Wash.Agr.Expt Sta.Popular Bul. 61; 4 pp.

Crude oil emulsions are promising for the peach twig borer. Kerosene emulsion has been used with good results.

1948 1923. Yothers, M. A. & Van Leeuwen, E. R.

Codling Moth control in Rogue River Valley.

Better Fruit,Vol.XVII,No.11,pp.7-8 and 28-24.

A miscible oil has been found efficient as a spreader when used at the rate of 1-1/2%

1949 1924. Yothers, W.W. & Winston, J.R.

Mixing emulsified mineral lubricating oils with deep well waters and lime-sulphur solutions.

U.S.D.A. Bul. 1217. 5 pp.

The addition of potash fish oil soap to the water before adding the stock oil emulsion had been used with varying success to make diluted emulsions stable. Caustic soda and fish oil soap were used with better success and less expense than the soap alone. Experiments showed that certain colloidal substances, such as a casein, milk, skimmed milk powder, gelatin, corn meal, wheat flour, cornstarch, and laundry starch were equal to glue as a stabilizer in rendering oil emulsions MIScible not only with deep well waters but also with lime-sulphur solutions at various dilutions ranging from 1-10 to 1-100. The materials were divided into two classes:

(1) Those which were most effective when not heated to 170° F. such as casein, gelatin, skimmed-milk powder, and glue.

(2) Those which were most effective when heated almost to the boiling point, such as cornstarch and laundry starch, wheat flour and corn meal.

It was practicable to add those materials which require heat to the oil, water and soap, when these were heated to form the emulsion. In order to render oil emulsions miscible ~~so that they would mix~~ with

-2-

Yothers & Winston, D.B. 1217. (Continued).

either deep well waters or diluted lime-sulphur solutions, the following quantities were required for each 3 gals. of emulsion: Glue, 1 lb; skimmed-milk powder 1 lb; casein 8 oz; wheat flour 1 lb; cornstarch 1 lb; laundry starch 1 lb. To use a stabilized oil emulsion with deep well water, all that was required was simply to add it to the water in the spray tank.

1950 1925. Yothers, W.W. & Winston, John R.

Preliminary report on colloidal clays as emulsifiers for mineral oils used in spraying citrus groves.

Jl.Agric.Research,Vol.31,No.1,pp.59-65.

Kaolin, fuller's earth, and other colloidal clays were used in lieu of soap in making emulsions of mineral lubricating oils for spraying citrus trees. These emulsions were about as effective against insect pests as the soap emulsion and no more likely to cause spray burn. The clay emulsions mix with any water or desired spray combination without special treatment. They were easily made, will keep indefinitely, and cost much less than soap emulsions.

1951

Young, C.J.
922. Notes on the binomics of Stegomyia calopus, Meigen, in Brazil, Part I.
Ann. Trop. Med. & Parasit., Vol. XVI, No. 4, p. 389-406.

The larvae of this species were successful in penetrating a thin film of oil to obtain air.

1952

1918. Young, D.

The problem of water pollution in relation to mosquito control.
Proc. Fifth Ann. Meeting, N.J. Mosquito Extermination Assoc., pp. 35-42.

The remedies for Culex pipiens and C. sylvestris are frequent trimming of the banks of open sewers and the liberal use of crude oil.

1953

1920. Yusope, M.

Some insects pests of padi.
Agric. Bull. F.M.S., Kuala Lumpur, Vol. VIII, No. 3, July-Sept., 1920, pp. 187-189.

Sucking insects which damage the immature padi seeds are controlled only by sweeping the insects with a net and killing them in a mixture of kerosene and water.

1954

Zappe, M. P.
(1918)

A Cockroach pest of greenhouse, Pycnoscelus surinamensis, L.

17th Rept. Conn. State Entomologist for 1917, Conn. Agric. Expt. Sta., bul. 203, 1918, pp. 302-313.

Kerosene and sawdust was tried as a repellent for cockroaches. This kept them away from the plants. Any roaches that came in contact with the kerosene were killed. Pure kerosene sprayed along the top and sides of benches brought out all the roaches that were near the surface; great numbers were killed. Kerosene was sprayed in all the holes where the roaches might be hiding. This brought them out and when they came in contact with the oil they were killed. Kerosene will burn foliage. Care must be taken so that the spray will not get on the plants. This treatment was very effective.

1956

1912 - Zimmer, J.F.
Papers on deciduous fruit insects & insectiddes

The grape scale.

USDA Bur. Ent. Bul. 97; Pt. 7, pp. 115-124.

Kerosene and crude petroleum emulsion may be used. Proprietary sprays such as miscible oils are easy to use.

1955

1888. Zimmer Bros.

Kerosene emulsion and the cabbage maggot.

Insect life, Vol. 1, no. 2, p. 15.

1957

The R & H formula

This formula was not found under the above name in any of fifty or more of the references investigated. The formula was however identical in all of them. In all these cases it is practically identical with the formula given by Hulst, 1888, reference 905, and credited to Riley and that given by Luggar, 1895, reference 1047, and credited to Hubbard and is as follows:

Kerosene	2 gallons	67 per cent
Common soap or whale-oil soap ½ lb.		33 " "
Water	1 gallon	

Wanting: 1958-1970.

1971 - 2755 in separate binder.

SUPPLEMENTARY ABSTRACTS

-15 1924. Purdue Agr. Expt. Sta. – Extension Service News Notes.

Results of a conference between A. J. Ackerman, B. A. Porter, W.P. Flint and J. J. Davis at Vincennes, Ind., Sept. 26, 1924.

Recommendations:

For San Jose scale on apple use oil sprays on dormant trees in sprin and fall (preferably the former) when temperature is above 40°F. Boiled lubricating oil emulsion at 2% strength was effective; for heavy infestation 3%. All the miscible oils tested ~~were~~ used at the strength recommended by the manufacturers. Cold mixed emulsions have given favorable results but greater difficulty is experience in obtaining a stable product. Formula fo boiled emulsion; oil 1 gal, k-fish oil soap 1 lb, water 1/2 gal. Oils with 0.87-0.93 sp. gr., not more than 2% volatility and Sabolt viscosity (100°F) of 90-250 secs. have given best results; Many waters in Illinois and I iana require 2 lbs soap for stable emulsions. The addition of 1/2-1/2-50 B is recommended when diluting to spray strength. Summer sprays are not s except under special conditions where scale is abundant. The injury has b repeated from use during the dormant period. Freezing does not seem to int fere with the miscibility of the emulsion if undisturbed, but jarring or turbing when frozen may have a harmful effect.

2-3% lubricating oil will control San Jose scale in peach during th dormant period without tree injury. The oil alone has no fungicidal value Bordeaux-oil combination probably has some effect on peach-leaf curl.

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8 1925. Alden, Charles H.

San Jose Scale Control with lubricating Oil emulsion on peach trees in the south

Jr. Econ. Ent. vol. 18, no. 2, pp. 253-257.

Dormant Treatments 1922-23. Red engine oil emulsion (1 gal. oil, 1/2 gal. water, 1 lb. K-fish oil soap) gave 97.8 o/o kill of San Jose scale (600 to 1100 scales counted) for 2 o/o oil ~~strength~~ strength and 85 o/o kill for li sulfur (1 to 8) Control had 31.8 o/o dead scale. Another plot gave: Red engine oil emulsion, 2 o/o oil, 82.6 o/o kill, lime sulfur (1 to 8), 75.7. o/o kill, control 10 o/o dead. This plot was sprayed again giving: 2 o/o oil, 99.9 o/o kill, lime sulfur (1 to 8) 87.9. o/o kill (based on 700 scales) No injury resulte from the oil spray, and very slight injury from the lime-sulfur. It was found that ~~less~~ 10 o/o living scale will reinfest an orchard by the following fall.

Late summer treatments 1923: Commercial lubricating oil emulsion 2 o/o oil killed 91.8 o/o; cold pumped Ca caseinate emulsion 2 o/o oil killed 85.9 o/o. Control 57.5 o/o scales dead. Serious foliage injury resulted, about 25 o/o of leaves fell.

Dormant Treatments 1923-24: Commercial lubricating oil, 2 o/o oil, 99.2 o/o killed; cold pumped Ca caseinate emulsion 2 o/o oil, 97. 5 o/o. Homemade lubricating oil emulsion (red engine oil), 2 o/o oil, 99.7 o/o kill; same but light oil, 2 o/o oil, 98.2 per cent kill; miscible oil (commercial) 1 to 20, 93.5 o/o kill; lime sulfur (1 to 8) 86.3 o/o kill, Control 10. 4 o/o dead. No tree injury from the oils even with as much as 3 o/o oil. Slight twig injury resulted from the lime-sulfur.

Delayed dormant treatments 1924.: Trees sprayed just before the buds began to swell with 2 o/o oil with commercial lubricating oil emulsion and cold pumped Ca caseinate emulsion gave no injury

Treatments by Growers 1923-24: 2 o/o oil gave 97. to 100 o/o scales kille without tree injury. K-fish oil soap emulsions broke in hard waters.

One application of 2 o/o oil is sufficient for moderate scale infestations, 2 applications for severe infestations.

1901-Aldrich, J. M.

11 I- Crude Petroleum; II- The Elm Louse; III- The Pear-leaf Blister Mite. Idaho Agr. Expt. Sta. Bul. 26, pp. 15-24.

The commercial crude petroleum was a heavy opaque brown oil, with a specific gr of 95.4, the density of the Baume scale being 16.8. It is different from the crude p leum used in the East and cannot be sprayed pure. An emulsion was made by combining soap suds. This was more effective than with kerosene. Two-thirds soap suds and 1/3 petroleum was used. The Western oils belong to a different series, having an asphal instead of paraffin base. Results on San Jose scale spraying with petroleum: Pure p leum on a large pear tree showed no injury and no live scales; one side of an apple was sprayed with 50% emulsion. It was in good condition and free from scale. 50% e was put on pear trees for blister mite, but was not successful. This was due to th sion being too thick to penetrate the bud scales. Pears were sprayed with 25% emul Apparently they were free of scale and the fruit and foliage were much better than unsprayed trees. Prunes were sprayed with 20% emulsion. Some scales were present in but fruit and foliage were larger; Several peach trees were sprayed with 5% emulsi some scales were still living in the fall. Apple aphid eggs were kept from hatchin emulsion containing 33-1/3% petroleum. The elm aphid was also killed in the same w Formula: For making the emulsion:-Dissolve 1/2 lb. hard soap in 1 gal. boiling wat still hot remove from fire and add 1 gal. petroleum in the reservoir of the spray Pump material thru with considerable force 4 or 5 ~~minutes~~ minutes. Dilute and sti before use. Petroleum emulsion 33-1/2% was successful against the elm aphid eggs. Ke sene emulsion might be used at 20% strength. Experiments on blister mite of pears that spraying with 20% kerosene emulsion, just before the buds start in the spring successful. Formula for kerosene emulsion: 1/2 lb. soap dissolved in 1 gal. boili add 2 gals. of kerosene and emulsify. When made dilute with 7 gals. of water for the blister mite. For use on Green Aphis, it should be diluted with 17 to 20 gals. of wa

113 1917. Back, E.A. and Crossmann, S.S.

Miscible Oils vs. Fish Oil Soap Sprays for the Control of Florida Aleyrodids.

Jour Econ. Ent., vol. 10, no. 5, pp. 453-458.

Analysis of Commercial oil used: Sp. gr. 20°C. 0. 9123, mineral oil 63.24 o/o, fatty acids from soap 5.61 o/o, Na_2O 0. 63 o/o water and undetermined 30.52 o/o. Rosin oil not present. Showers falling soon after application of Miscible have little effect on efficiency while they affect the fish oil soap spray. Miscible oils are also operative over a larger period than fish oil soap.

Effectiveness of the Miscible Oil: 1.75 o/o - 98.5 o/o killed;
1.67 o/o 98.0; 1 o/o 95.7.
0.75 o/o 92.5

137 Becker, George G. Jr. Econ. Ent. 15, p. 105-106 (1922)

Miscible Oils are ineffective against the camphor scale.

Lubricating Oil emulsion (2 o/o Oil) is very effective.

<u>Formula:</u>

K- fishoil soap	2 lbs.
Jr. Red Engine Oil (Standard Oil Co)	2 gals.
Water	1 gal.

The soap solution is brought to a boil with live steam, the oil is added and boiled 5 minutes. The mixture is pumped twice.

Cost of concentrate 25c. per gal.

1906

146 Bedford, (11th) Duke of- and Spencer, W.

Woburn Expt. Fruit Farm 6th Rpt., London. 235 p

Paraffin & Paraffin Emulsions (pp16-24)

Paraffins in England consist of 20 or more mixtures differing widely in composition and essential properties (Shale oils contain S & other compounds and would probably be injurious to trees). These oils come from America, Russia, Roumania, Borneo, etc.

The paraffins may be divided into 3 classes depending on volatility: (1) Benzine naphtha, and motor spirit boiling up to about 150°C. (2) Lighting oils, petroleums, solar distillates, etc., varying considerably in composition from oils which distil entirely below 300°C to other oils of which only a fraction will distil <u>below</u> this temp. (3) Vaseline, petroleum jelly, paraffin wax and some lubricating oils.

~~Duke of Bedford and Pickering~~

The oils of the 2nd class are largely used in spraying practice although crude petroleum is used especially in America.

Oils of the 2nd class may be so volatile that they will not remain on the tree long enough to act on the insect, or so non-volatile as to coat the tree with oil.

The use of undiluted oil has been largely abandoned in England.

Oil-water mixures and machines for applying them have not been used in England and they have practically been abandoned in the U. S.

Soap in an emulsion has an appreciable insecticidal action

24 formulas for emulsions are given in which the ratio of oil to soap varies from 100: 1.2 to 100: 240

~~Duke of Bedford and Pickering.~~

A chapter on the chemistry and insecticidal uses of soap is given (pp 25-27).

<u>Results with undiluted paraffins</u> (pp 75-82)

Undiluted paraffins cannot be used safely on bearing apple trees. The sp. gr. initial b.p., and the % distilling up to 200° from 200 to 250° and above 250°C are given for the oils used, together, with the sp. gr. of each fraction. The results with the various oils on oyster-shell scale eggs follow:

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Type of Oil	Name of Oil	Mortality caused
Heavy oils	Crude petroleum	100 %
	Solar distillate	91
Lighting oils	Guelder Rose	33
	Royal Daylight	33
	" " B	33
	White Rose	100
	Lighthouse	100
	Kerosene	33

~~Duke of Bedford & Pickering~~

Lighter oils, etc.	Special oil	65
	Benzine (Carless & Co)	1
	" Shell Co	5
	Rectified benzine	10
	Double " "	5
	Mineral naphtha	10
	Deodorized	5
	Pratts' Motor Spirit	2-20
	Methylated spirits	0
	Wood spirits	0
Fractionated Guelder Rose	165-220°C	40
"	220-285°C	50
"	Above 285°C	99

To be effective at least 40% of the oil should have a b.p. higher than 250°C

~~Duke of Bedford & Pickering~~

Results with paraffin emulsions (pp 83-86)

Emulsion containing 1.25% paraffin and 2.5% soap killed 2% or less of the eggs of the oyster-shell scale. The paraffin was Guelder Rose, the soap Knights' B.B.

no mortality was found till the soap exceeded 1%; with

With the oil constant and soap varying from 0.3 ~~[illegible]~~ to 2% soap the mortality was 5-21%; with 5% soap the mortality was 100%.

With the soap constant (at 1%) and the oil varying, no mortality occurred till the oil exceeded 6%: with 15% oil it was 75%.

The results are shown in the following table, the emulsions being applied with a brush:

Emulsions with 1% Soap and	% Mortality
1% oil	0
2 "	0
4 "	0
6 "	15 (1-40% range)
8 "	13 (5-25" ")

~~[illegible]~~

10 - -	40 (30-50% range)
15	43 (10-75% "

Results with emulsions containing caustic soda, Emulsions applied with a brush (pp 87-93)

Emulsions with 1% Caustic soda and	Mortality (%)
2% oil	3
4 "	20
6 "	74 (range 3-100%)
8	60
10	73
15	99

Comparison with the previous table shows the great effect produced by the addition of caustic soda. The effectiveness of these emulsions is not altered whether the mixtures are applied while hot or while cold. The caustic soda can be added to the soap solution before or after emulsification.

The indications are that a light oil (benzine) would be effective in a caustic soda emulsion although ineffective alone.

~~[illegible]~~

Different soaps may alter the effectiveness of a caustic soda emulsion. quantity of soap may be reduced to 0.5%.

Formula for caustic soda emulsion: 1-1/2 lb soft soap ~~are~~ are dissolved in [illegible] gal H_2O: emulsify with 2 gal oil by means of a garden syringe equipped with [illegible]se jet. Pour the emulsion into 30 gal H_2O in which 6-1/2 lbs caustic soda [illegible] have been dissolved. Use immediately to prevent carbonation of the [illegible]. [illegible] water is preferred for making the mixture. Costs are given.

[illegible] NH_4OH has [illegible] suggested but it was not [illegible].

Effect of rain etc., on the results of spraying (pp 106-113)

Branches of trees containing eggs of the oyster shell scale were wetted after which the insecticide was applied with a brush.

Results:

	Without wetting	With wetting after applying insecticide
Paraffin emulsion	11% killed	16% killed
Caustic soda emulsion (weak)	Same	Same
" " " (strong)	44	60

Writers believe this effect is due to action of the soap and paraffin giving the eggs a second dose of insecticide. The water dissolves the soap and the paraffin will be washed down onto the eggs.

Nature of the action of insecticides (pp 124-132)

The writers attempted to explain the action of caustic alkalies in soap emulsions. It was thought that the soap or paraffin might coat the alkali and prevent it from becoming carbonated. It was found however that the caustic alkali rapidly disappeared from the tree and it combined with the sap.

The following suggestions are made: That the action of the insecticide on the eggs is mechanical (O_2 and moisture excluded by coating); that the eggs are mechanically glued to the twigs, preventing the egress of the insects; that the action may be osmotic (doubted by writers); that the action is purely chemical (the insecticide destroying the walls of the cells composing the egg sac and thus gaining an entry into the latter). The writers favor the latter suggestion. They suggest further that the destructive action of paraffin on vegetable and animal cells is a reducing action, the paraffin extracting O_2 from the cells.

Delayed dormant spraying was more effective on oyster shell scale eggs than earlier dormant spraying.

Effect of undiluted paraffine and other washes on trees (pp 135-142)

The lightest oils gave least injury to apples but damage was considerable. There were exceptions to this, however, one of the lightest of the burning oils half killing a tree. Crude oil eventually had little effect on the trees, although at first it seemed to injure them seriously.

Soda emulsion was not injurious to the trees.

Soda emulsion will destroy moss on trees, whereas ~~single~~ simple oil emulsions and undiluted paraffin were ineffective.

Note on emulsions (pp 196-209)

The particles of an emulsified liquid appear to be remarkably uniform in size and are held in position by a balance of forces. If this balance is upset, de-emulsification results. All emulsions are probably in a state of gradual change.

In this investigation, the soft soap was "Imperial" soap (Chiswick Co), the oil, "Lighthouse" paraffin oil and emulsification was effected by pumping through a garden syringe with rose nozzle at 18°C.

Maximum soap required:

Soap %	for	Paraffin %
1.67 - 2	"	75
2.4 - 3	"	67
18.2 - 25	"	60
Over 25	"	50

Mimimum soap required

Soap %	for	Paraffin %
More than 0.5	"	70,80, or 90
About 0.3	"	About 45
Less than 0.3	"	40 or less.

If a mixture does not emulsify at once, continued pumping will not make it emulsify.

High temperature (nearly boiling) facilitates emulsification, but is not essential for good emulsions. Heating will often permit emulsification where the mixture could not otherwise be emulsified, (as excessive oil, too much or too little soap).

Mixtures which will not emulsify in the ordinary way may be made to do so by emulsifying part of the oil then adding the rest gradually and pumping after each addition. It appears that the first portions of the oil on emulsification were removed from the sphere of action leaving the soap solution free to emulsify the remaining oil.

Upon standing, an emulsion separates into a lower aqueous layer containing 1-2% oil and an upper creamy layer containing 67-75% oil by vol. These proportions are always present so long as the soap solution at the start is within the limits indicated above and the oil at start is not over 75%. If the lower layer contains 5-10% soap, no oil is present in it. On long standing the upper layer will separate into two zones.

With larger amts. of oil, buttery mixtures are obtained. One containing 99% paraffin and 1% H_2O with 0.01% by wt of soap was obtained

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which was stable for several months. When shaken with water these solid emulsions separate into an aqueous layer and an emulsion containing 67-75% oil. On exposure to the air, the whole becomes de-emulsified in a few days.

In practically all cases the emulsions had constant ratios of oil, the individual mixtures grouping themselves about means of 66.7%, 75% and 80% oil.

Emulsions usually contain oil globules of 2 sizes, the smaller ones being very uniform. A 99% emulsion of burning oil contained large globules that are 6-7 times the size of the smaller. A 94% emulsion of benzine contained large droplets that were only half the diameter of those in the 99% emulsion. An emulsion like this with the inter-globular space filled with smaller globules will account for % of oil higher than 74% but will not explain the simple ratios.

Emulsions with less that 67% oil are unstable.

Bedford, (11th) Duke of- and Pickering, S. U.
1903.
147 **Woburn Expt. Fruit Farm 3th Rpt. pp. iv + 127.**

Summary (pp 116-127.

Emulsions consist of oil globules surrounded by a pellicle of solid particles. The particles may consist of soap (which is insoluble in the oil) or of substances pptd from solutions such as basic Fe or Cu sulphates. Emulsions made with the latter emulsifiers are compatible with many more substances than are emulsions made with soap emulsifiers. No heat is required with them.

Formula: $CuSO_4$ - 1.5 lbs in 3-9 gal H_2O; add 1/2 lb fresh lime previously slaked and mixed with water. Churn with 5 pints paraffin oil and add 2 lbs NaCH. Then make up to 10 gals.

Where $FeSO_4$ is used, the amount is 8 ounces to 10 gals; eliminate the lime if desired and increast the NaCH to 2-1/8 lbs. The best results are obtained by including the lime and use a high boiling paraffin such as solar distillate. For a summer spray use 16-24 oz paraffin to 10 gals. With 24 oz the density of the mixture equals that of water.

Lead and Ca arsenates will also emulsify paraffin and they may be included in emulsions made with $FeSO_4$. Sulphur cannot be used.

Many fine grained powders make quasi-emulsions in which the particles of oil and solid are entangled together. They form coarse mixtures of a different nature from emulsions. When they are diluted some of the oil separates and the distribution on the tree is uneven. Emulsions of lime water and oil and the soap-oil soda wash are of this nature.

Lime does not increase the effectiveness of an oil emulsion as NaOH does.

The activity of an emulsion soda wash could probably be increased by the addition of NaCH.

1-1.5% emulsion of solar distillate was very effective against caterpillars: 1% was too weak for aphids.

1.5-2% paraffin oil in emulsions rarely caused damage to apples and plums in foliage. 6-35% can be used safely on dormant trees.

Formulas:

1. Winter wash for moss, lichen, scale and some fungi

$CuSO_4$ - - - - - - - - - - - -	1.5 lbs
Lime	0.5 "
Solar distillate	5 pints
NaCH	2 lbs
Water to make - - - - - - - - - -	10 gals

2. Winter wash without fungicidal properties:

$FeSO_4$ - - - - - - - - - - -	8 Oz
Lime	4 "
(or lime water 9-1/2 gals or NaCH 2-1/2 Oz)	
Solar distillate	5 pints
Water to make	10 gals
NaCH	2 lbs.

The addition of 10 lbs of NaCH to either of the above would increase their effectiveness.

3. Summer wash for caterpillars, aphis and mildew:

Same as #1 but without NaCH and with only 16-24 oz. solar distillate in 10 gals.

Or: $CuSO_4$ - - - - - - - 10 oz
Lime water 8 gal: 3 pints
Solar distillate 16-24 oz
Water to make 10 gals.

4. Summer wash for caterpillars and aphis only.

Same as #2, without NaOH and with 16-24 oz solar distillate. Increase the $FeSO_4$ to 10 oz and the lime to 5 oz.

207 Britton, W. E., 1901- Rept. Conn. Agr. Expt.Sta. for 1900 (1901) p.314-22.
Miscellaneous notes on insects and insecticides.

Kerosene emulsion was used in a barn for the clover hay caterpillar. This application killed some of the caterpillars, but did not destroy the pupas. 10 & 15% kerosene in water was effective against the elm scale without injury to the elm. Pear trees were sprayed using 10% and 15% kerosene in water. The foliage was uninjured by either strengths, but it was not effective against pear Psylla. Also a 15% mixture was used against the purple aphis on young apple twigs. Both twigs and lice were destroyed. A 10% mixture was used against Oyster-shell scale on willow; the insects were killed and the foliage uninjured. Spiraea and Japanese quince were treated with 10% mixture to kill aphis. Neither leaves nor lice were destroyed. 15% on spiraea killed the lice and left the foliage uninjured. Sweet peas were injured with 15% and lice killed. Squash vines were sprayed with 10% mixture to kill squash bugs. It was effective against the bugs and only slightly injurious to margins of leaves. 10, 15 and 20 % mixtures were sprayed on elm leaf beetle pupae. Not a single beetle emerged. 15% was effective for red spider on carnations with no injury. The same mixture was effective for white flies, with no injury to tomato plants.

209 1902-Britton, W.E. (Experiments in spraying to kill the San Jose Scale, Season of 1902, pp.114-127) 2nd Rept. of St. Ent. Conn.St.Sta. Rpt.1902,pt.2, pp.99-178.

Crude oil (undiluted and in 25% mixture with water) and kerosene (25% mixture with water) were used for the experiments. Three kinds of crude oil were used: Standard oil Co., testing 43° Be., Derrick Oil Co., testing 45° Be., a black oil, purchased near Terryville, 35.8° Be. Crude oil undiluted is liable to cause injury to some trees even if applied under favorable conditions and with care. Crude oil and kerosene either undiluted or 25% mixture, will kill the scale insects if it comes in contact with them. ~~and~~ It coats the surface reaching into the crevices of the bark much better than most liquids. Oils should be applied on bright days in the early spring just before the buds open. If applied in the late fall or early winter there is a long period of inactivity of the tree, during which the oil may penetrate and injure the cambium.

216 1908- Britton, W.E. & Walden, B.H.
Rept. of the State Ent. Conn. for 1907-08, pp. 837-842.

References to Prof. C. L. Penny Bulls of Delaware #75 & 79, and Mr. C.D. Jarvis, Bul. of Conn. #49. A trial of preparing and useing homemade soluble oils is given. Two lots were tried. The first barrel of paraffin oil was used, then a second was ordered. This failed to emulsify; new proportions were worked out. Oil experts say that common trade names of oils are meaningless as far as the exact chemical composition is concerned. It seemed that the first cost of the materials, together with the uncertainty of obtaining uniform oils make it impracticable for any except the larger orchardists to ~~keep~~ prepare their own soluble oil. Orchard tests were made. The mixture worked nicely except that a thickened oily residue formed in the pump barrel. This may have been due to excess of rosin oil. The scale was kept well in check. Various other tests were made. The oil was mixed with water 1-15. Some of the tests were satisfactory, others were not. A soluble oil made by Thomsen Chemical Co., Baltimore, Md., was satisfactory and trees were clean in the fall. San-U-Say was tried. This needed sal soda to make it emulsify. Both oils were used 1-15. Another oil was used. Results were not so good. This should have been used more concentrated. Soluble oils will be used for spraying apple orchards where it is difficult to coat the pubescent twigs with lime-sulphur wash, and to reach the scale insects under the edges of the rough bark and the bud scales.

263

1923 - Burroughs, A.M.

A new method of making engine oil emulsions.
Mo. Agr. Expt. Sta.Bul. 205, 8 pp.

Methods of preparing engine oil emulsions are given in U. S. D. A. Circ. 263, and Circ. 109 of this station. In the course of later experimental work, it was found that oil emulsions could be made without the potash fish oil soap and without heating. The materials which had been used as stabilizers were found to act as emulsifiers, just as the soap does. These are: freshly made Bordeaux mixture, freshly made copperas-lime mixture, calcium caseinate, saponin and others. Four formulae are given (1) Engine oil 2 gals., water 1 gal., copper sulphate or iron sulphate ½ lb. burned lime ½ lb. (2) Engine oil 2 gals., water 2 gal., copper sulphate ½ lb. or iron sulphate ½ lb., burned lime ½ lb., (3) engine oil 2 gals., water 1 gal. Kayso 4 oz., (4) Engine oil 2 gals., water 1 gal., saponin 4 oz., They are made by ~~mixing~~ pumping the oil, water, etc. ~~by the mixture~~ back on itself, Using a course spray. After a minute's pumping, reduce the opening in the nozzle until a fine spray is obtained and pump the emulsion into another container. The cold emulsions have proven to be as efficient as the oil-soap emulsions against the San Jose scale and the grain aphis. No injury to apple trees resulted from 1 year's use in the dormant, delayed dormant and cluster bud stages. The cold emulsions are somewhat cheaper and easier to prepare than the oil-soap emulsions and very much cheaper than lime-sulphur and the miscible oils. They break down more easily in storage than the manufactured oil-soap emulsions, but can be re-emulsified by pumping thru a spray nozzle. The cold emulsions have the advantage that they do not break down in the presence of hard water or water contaminated with lime or lime-sulphur, as do the soap emulsions.

264 1923. Burroughs, A. M. and Grube, W.M.

A simplified method for making lubricating oil emulsions.

Jour Econ. Ent. vol. 16, no. 6, pp. 534-539.

The government formula for engine oil emulsion (2 gals. oil, 2 lbs. K- fishoil soap, 1 gal. H_2O) does not give 66-2/3 o/o oil. To obtain this percentage the following formula must be used:

Engine Oil	2 gals.
K-fishoil soap	2 lbs. (about 1 quart)
Water to make a total of	3 gals. (about 3 qts.)

Good emulsions have been made by reducing the soap to 1-1/2 lbs. If mixed with H_2O containing an appreciable number of Ca ions, spontaneous de-emulsification occurs, with the formation of Ca soap. Ca soap tends to stabilize emulsions of water in oil rather than oil in water. Under working conditions de-emulsification rather than change of state occurs. Following the work of Pickering (J. Chem. Soc. 91, 2001 1907) emulsions were made with various inorganic emulsifiers without the use of heat. Formulas for stock emulsions:

#1.	Engine Oil	2 Gals.
	Tap water	1 gal.
	$CuSO_4$	1/4 lb. (or Fe_2SO_4 1/4 lb.)
	CaO	1/4 lb.
#2	Engine Oil	1 gal.
	Tap water	1 gal.
	Cu SO_4	1/2 lb. or (Fe_2SO_4 1/2 lb.)
	CaO	1/2 lb.
#3	Engine Oil	2 gals.
	water	1 gal.
	Ca Casenate (Kayso)	4 oz.
#4	Engine Oil	2 gal.
	water	1 gal.
	Saponium	4 oz. (or extract from 1/2 lb. soap bark)

Preparation: Add to the oil the required amount of $CuSO_4$ or Fe_2SO_4 dissolved in 1/2 the H_2O, then add the CaO suspended in the rest of the water. Mix slightly and pump, using a Bordeaux nozzle adjusted to give a fine spray. Kayso emulsions are made by suspending the Ca casinate in water, adding the oil and pumping. Saponium is stirred up in the water; the oil is then added and the mixture pumped. Pump at least twice. Bordeaux and $FeSO_4$-lime mixtures must be freshly made. These emulsions have larger oil globules than oil-soap emulsions. Those made with basic metal hydroxides show a little separated oil after a time. They do not separate spontaneously with hard water or lime sulfur. On dilution the emulsions tend to rise to the surface but may be kept mixed by agitation. By using the proper proportions an emulsion may be obtained with a sp. gr. of 1. Authors suggest that basic sulfates of Fe and Cu, when freshly prepared, act as hydrated colloids and thus fulfill the requirements of a good emulsifier as given by Holmes. (Lab. Manual of Colloid Chemistry, N.Y. 1922).

Burroughs and Grube. J. Econ. Ent. 16, p. 534 (1923)

Stabilizing agents probably form a film around any unprotected oil particles. These oil particles may be gotten into the presence of the stabilizer (hydrophile colloid) chemically by destruction of the soap film or mechanically by breaking up by means of a spray. The reason why only freshly prepared Bordeaux mixture is efficient as a mulsifier is not known, but probably depends on the degree of dispersion of the basic $CuSo_4$. Coagulation proceeds rapidly in Bordeaux, due to the presence of lime and gypsum which are flosculating agents. If Bordeaux acts as a solvated colloid, the decrease in hydration due to coagulation may prevent emulsification. A parallel case is furnished by skim milk. Fresh skim milk makes good emulsions for a time but clabbered skim milk in which the casein has coagulated and become less hydrated is not a good emulsifier. Emulsions containing 2 o/o Diamond Paraffin Oil, made with K-fish oil soap, gave 96.2 o/o kill of San Jose Scale, Kayso, 97.8 o/o, sapomium, 98.5 o/o, Bordeaux mixture, 95.7 o/o. The same concentrations of these emulsions against the grain aphis gave the following :

K-fish oil soap	92 o/o
Kayso	96.2 o/o
Bordeaux Mixture	90 0/o

The efficiency of the oil is little affected by the nature of the emulsifying agent. The differences shown are probably due to experimental error. Bordeaux-oil (lubricating, 2 o/o) gave 96 o/o control of aphids in an orchard when applied at green tip stage.

No date - Childs, L.

313

Entomological Investigation, 1915.
Report Hood River Branch, Expt. Sta. for 1914-1915, Oregon Agric. Coll. Expt. Station, pp. 47-61.

Fruit Leaf -roller.

Four oils were used in eight experiments on the fruit-tree leaf-roller as follows: Kerosene emulsion 18%, distillate emulsion 18%, crude oil at 1-12 and 1-15, Miscible oil at 5, 6, 7, and 8 gallons to 100 gallons of water. The kerosene and distillate emulsions were not effective in controlling leaf-roller eggs. They seemed to lack sufficient penetrating qualities; crude oil emulsion gave slightly better results than the kerosene or distillate. This spray retarded the foliage and caused a malformation of the leaf growth on many trees. The results obtained from the miscible oils were highly satisfactory. The foliage was burned to a slight extent in the 5-100 dilution and increased to a very large extent with increasing strengths. All the foliage thus exposed to the spray dropped off. The fruit spurs were only slightly injured. During late summer no difference could be noted between the trees sprayed and the checks.

Woolly Aphis: Because of their penetrating quality oil emulsions are recommended for woolly aphis. The addition of soap tends to increase the penetration and spreading qualities of the oil. The following formula is given for combating woolly aphis.

Miscible Oil	4 or 5 gallons
Whale oil soap	2 to 3 lbs.
Water	100 gal.

If the leaf roller is present in the orchard the oil may be increased to 6 gallons.

1917 - Childs, L.

314 Further observations on control of the fruit-tree leaf-roller in the Hood River Valley.

Hood River Branch; Oregon Expt. Sta. Bul. 141, pp. 17-27.

Besides thoroughness in application, the most important feature required in destroying leaf-roller eggs with oil is the existence of fair, settled weather for several days following spraying. The variation of results was not due to inferiority of materials, but to the weather prevailing at the time of application (Spring of 1916). Emulsions made from paraffin base oils spread better than those from asphaltum base oils. The addition of 1 to 2 gallons of liquid soap to 100 gals. of emulsion greatly increased the spreading properties of the spray. Miscible oils used at the rate of 6 - 100 during 1915-16, although causing considerable foliage injury when used after the fruit buds begin to show, have not injured these buds sufficiently to reduce the crop or to cause an injury to the tree other than slightly retarding its development. In both years, a very high percentage of the eggs were destroyed when the oils were applied at this time.

346 1902 - Clarke, W.T.

Calif. Agr. Expt.Sta. bull. 144, 44 p. (The Peach Worm.

Kerosene emulsion was made by two methods for winter spraying (1) 150° kerosene, 1½ pints; sour milk, 1 pt., water 2 gals.; (2) 1/4 lb. hard soap dissolved in 2 quarts water and 1 pt of kerosene. Each of these were diluted with 2 gals. of water. Distillate oil (28°) was also used. Results on the hibernating peach worm were negative.

Distillate oil emulsions were made with 5 gals. oil and 4-6 lbs. common kitchen soap. Dissolve the soap in 4 glas. hot water. Pour the oil into the hot suds and thoroly churn it. To use, diluted 1-8 preferably with hot water. Applied to the trees while warm. The kerosene oil emulsion was prepared in the same way using no more than four lbs. of soap. These emulsions must be used in the early spring to be effective.

1905- Close C. P.

354 The New K.L. Mixture and San Jose Scale.

Delaware Coll. Agr. Expt.Sta. Bul. 68, 23 pp.

K-L is a mixture of kerosene, hydrated lime and water. Crude petroleum is not satisfactory in making K-L and its use is not advocated. Limoid is the particular form of lime used in developing the mixtures. Ground lime cannot be used. Limoid is hydrated or dry slaked magnesium stone lime. There seems to be a difference between limoid and dry slaked or air lime in the power of holding kerosene. The limoid is primarily a carrier for the kerosene. It makes possible a mixture of absolutely uniform strength. The limoid probably has a smothering effect on the scale. There is no chemical action between the kerosene and the limoid. Kerosene is the killing agent. One pound of lime will absorb 1 quart of kerosene and in this proportion the mixture should always be made, that is 4 lb. of lime to 1 gal. of kerosene. When properly made, any of the K-L mixtures will spray as readily as pure water thru' any nozzle. The K-L mixture will lose water upon standing. Hence an increase of the percentage of kerosene. This loss can be replaced by adding water before using. K-L has several different forms. K-L-B is kerosene, lime and Bordeaux mixture. This is made exactly like K-L, except that Bordeaux mixture is used instead of water. K-L-B-P is kerosene, lime, Bordeaux mixture and poison. It is made like K-L-B, except that the poison, whether Paris green, disparene, arsenite of lime or soda, or green arsenoid, is added to the Bordeaux mixture. A number of adhesives were tried with K-L. Rosin soap seemed to improve the efficiency of K-L. There is a tendency to increase foliage injury when rosin soap is used. K-L and Bordeaux mixture proved very efficient. Copper sulphate was the best adhesive tried, but for some reason the K-L prepared with it was not always efficient in killing scales. Salt was tried but foliage injury was increased. Caustic soda 1 lb. to 12 gal. K-L made a good mixture for use during dormant season. Sulphur was tried in different ways but made the mixture unsatisfactory. For use during the summer it is safe to apply 10% K-L with or without adhesives, to apples, pears, peaches, plums, cherries, quinces, currants, etc. From tests made it seems perfectly safe to advocate 12½% K-L on all of these fruits and even 15% on apples and pears. A slight leaf injury may follow. Numerous successful tests were made. The results with the K-L are at least as reliable as the lime-sulphur-salt wash. While no form of K-L has been tried on the various aphids, pear psylla, and other sucking insects, there is no apparent reason why it should not be completely effective against them.

357 1906 - Close, C.P.

The K. L. Emulsions and Spraying.

Delaware Coll.Agr.Expt.Sta. Bul. 73, pp. 20.

The word "mixtures" in the name "K-L Mixtures" may be misleading, so it is dropped and the more appropriate word "emulsions" takes its place. The K-L emulsions were used quite extensively the past spring with results varying from complete success to utter failures. The two principal causes of non-success were improper preparing and incomplete spraying. Two applications are necessary, one in the late spring and another in late fall. K-L is made by pouring the kerosene and lime into a barrel and stirring together well with a paddle. Add 10 to 20 gals. of water and stir to loosen the kerosene and lime from the bottom and sides of the barrel. Pour in water until the barrel is more than 3/4 full and with a hoe or dabber, churn, splash and pound the K-L 4 or 5 minutes to emulsify it, then fill up the barrel with water and spray. Winter and summer strengths of K-L emulsions are given for the various fruits. Results of spraying with the K-L are given for peaches, cherry, pears, and apples. The K-L emulsion when carefully made and thoroughly applied in proper strengths is equal in effectiveness to any of the standard remedies. K-L-B 20% was used for peach leaf curl. The test was not conclusive. K-L-B-P controls the codling moth and plant diseases. K-L was tried on the trumpet leaf miner of apple. The treatment seemed to be effective. Care must be used to avoid tainting the kerosene with crude oil, linseed oil, or any other oil, because it is almost impossible to make an emulsion if even the slightest trace of these oils is present.

359 1907-Close, C.P.

Dipping Nursery Stock in Insecticides.
Delaware Col.Agr.Expt.Sta.Rpts. 1904-06, pp.48-69.

Apple~~s~~, pear~~s~~, plum and peach nursery stock were dipped in the following insecticides: K-L emulsion 25%, 30%, 35%, 40%, and 50%; pure kerosene, crude petroleum, Target Brand Scale Destroyer 1-10 & 1-15; Scalecide and Kill-o-scale each 1-10 & 1-15; Petroleum emulsion 1-10 & 1-15. Conclusions: For apples: 25% K-L dipping top only; Kerosene, dipping top only; Crude petroleum dipping top only; Target Brand Scale Destroyer, 1-15 dipping either tops only or tops and roots; Scalecide 1-15 & 1-10 the same; Kill-O-scale, 1-10 & 1-15 the same; Petroleum emulsion 1-15 or 1-10 the same. For Pears: 25% K-L dipping top only; Kerosene, the same; Crude petroleum, the same; Target Brand Scalecide, Petroleum emulsion, and Kill-o-scale 1-15 dipping tops only or tops and roots. For Plums: K-L 30%, 35%, 40%, and 50%, dipping tops only; Crude petroleum the same; Target brand 1-15 dipping tops only or tops and roots. For Peaches: There was so much injury by all the insecticides that no remedy used in these tests can be reported with favor. Dipping for the strawberry root louse was done with K-L 5%, 10%, & 15%; Kerosene emulsion 5%, 10%, & 15%, made with whale oil soap.

RESULTS:

Insecticide	Top and root: Plants dipped	Top and root: Plants lived	Roots only: Plants dipped	Roots only: Plants lived
5% K-L emulsion	10	9	10	8
10% " "	10	9	10	7
10% " "	10	0	10	0
15% " "	10	0	,0	0
15% " "	10	10	10	0
5% Kerosene emulsion with whale oil soap	10	10	10	10
10% " "	10	5	10	9
10% " "	10	10	10	10
15% " "	10	0	10	3
15% " "	10	3	10	9

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360 1899. Cockerell, T.D.A.

Some insect p sts of Salt River V lley and the remedies for them. Ariz. Agr. Expt. Sta. Bull. 32, pp. 273-95.

Kerosene , 2 gallons; whale oil soap (or one qt. soft soap) 1 to 2 lbs; water, 1 gallon. Dissolve soap~~s~~ in water by boiling, and add boiling hot to the kerosene. Agitate violently by pumping vigorously with a force pump. The mixture will have increased about 1/3 ~~inch~~ in ~~bulk~~ bulk.

Heating unnecessary. Agitate as in above

Milk formula~~s~~: Kerosene, 2 gals. sour milk, 1 gal. emulsion. Must be used immedietely, otherwise it will ferment and spoil. Summer applications dilute with 15 to 20 parts of water for plant lice and soft bodied insects. For scale insects dilute with 7-9 parts water.

1923. Connor, M.E. and Monroe, W.M.

374 Jour. Econ. Ent. vol.16, no. 4, pp. 380-385.
Notes on the length of time A calopus larvae should be exposed to a film of kerosene.

10 minutes exposure to a film of kerosene kills most of the larvae of A. calopus. Petroleum oil not only excludes the supply of O_2 but also acts as a toxin. The toxic action is more rapid than the mechanical effect. Not all oils show this property. Kerosene and Gasolene are effective; Salad oil is not. The larvae show by their behavior under a film of kerosene the toxic properties of this oil.

382a 1891 - Cook, A. J., & Davis, G.C.

Kerosene Emulsion, Some New Insects.

Mich. State Agric. Coll. Expt. Sta., Bul. 73; 16 pp.

Among the several insecticides few surpass in value the kerosene emulsion. It kills sucking insects as it kills by contact. Upon a visit from Dr. C. V. Riley in the autumn of 1899, Mr. Cook was told his formula was not an emulsion but only an unstable mixture. Cook said it was a stable mixture, capable of easy and perfect dilution. ~~There was some~~ Cook produced some which had stood for years. Dr. Riley said it was not emulsion, that it had separated, and was only a mechanical mixture, and had been used years before Cook had recommended it by Mr. Taylor and others. Gillette said he had found the Riley-Hubbard formula much better than the Cook formula. Prof. Taft had never used the Riley-Hubbard formula, but had found the Cook formula entirely satisfactory and wanted nothing better. The Cook formula is this: Dissolve in 2 quarts water 1 qt. of soft soap or ½ lb. hard soap, by heating to the boiling point, then add 1 pint of kerosene oil and stir violently for from 3 to 5 minutes. This is best done by pumping the liquid into itself thru' a small nozzle, so that it is thoroly agitated. This mixes the oil permanently so that it will never separate and can be diluted easily. Cook claims it was not necessary to use so much soft soap, but was better as it insured a perfect emulsion even upon dilution and the soap in itself was an insecticide and valuable, aside from its emulsifying power. The Hubbard-Riley formula is as follows: ½ lb. of soap, dissolved in 1 gal. boiling water, then two gals. of kerosene are added and immediately stirred as before. The Cook formula uses 4 times as much water as kerosene, while the Riley formula uses twice as much kerosene as water. The Cook formula calls for more soap.

Cook never failed to make an emulsion with his formula but the Riley formula failed with him in at least 46% of the trials to emulsify it. Prof. Gillette urges three cautions in making the Riley emulsion:(1) good soap, like Ivory; (2) a boiling temperature upon adding the oil, which must not be too cold; (3) everything must be clean. This would not have to be urged with the Cook emulsion.

While the kerosene is thoroly emulsified in the Cook preparation, the emulsion, owing to the excess of soap solution often separates from the remaining liquid upon standing, especially if made of soft soap, rising above the soap solution. This is true of the dilution. There is no free oil. Riley and Gillette saw this separation and thot the liquid was not emulsified. It mixed readily upon shaking. Upon dilution there was no free oil separating out.

Riley emulsion thickens completely, looking like thick cream. This makes it hard to handle, especially in winter. The viscid mass hides the imperfection of the emulsion so that it does not appear until dilution takes place. In every case, upon dilution, the Riley emulsion shows free oil, not a lighter emulsified liquid at the top.

Kerosene was obtained from Ohio, Indiana, Illinois, and Iowa. These were tried and all acted precisely alike. Not one gave a perfect emulsion with the Riley formula, as shown by the dilution when free oil rises at once to the top, while every one gave a perfect emulsion with the Cook formula.

Kerosene emulsion was used on plant lice by Prof. Taft with success using a dilution of 1-14, just when the buds were opening. This did not injure the tender buds and killed all the lice it touched. Kerosene emulsion was used on domestic animals without injury.

382b 1891- Cook, A. J. & Davis, G. C.

Kerosene Emulsion and Notes on Insects.

Mich. State Agr. Coll. Expt. Sta. Bul. 76, 16 pp.

In Bul. 58, it was stated that Cook was the first to use and recommend a practical kerosene and soap mixture. Henry Bird of Newark, N. J. as early as 1875, two years before Cook's discovery, advised mixing " a little kerosene oil", with "strong soap suds". Bird said it readily combines and can be applied uniformly with a syringe . This statement makes it almost certain that he secured an emulsion. The above item was in Gardner's Monthly for 1875, p. 106. In bul. 73 Cook said Riley's emulsion always failed. Hard water from artesian wells was used as it was more convenient; with perfectly soft water it does not fail, which fact was suggested by F. J. Niswander, an assistant in the laboratory at the time.

A good emulsion is one that is easily produced, one in which the kerosene oil will permanently unite with the emulsifying agent and not separate upon dilution even if allowed to stand for days or weeks.

Directions are given for making (1st) a soft soap and kerosene emulsion; (2) hard soap and kerosene emulsion;(3) the Riley-Hubbard formula. These directions are the same as in Bul. 58 and 73 of this station. Kerosene and milk formula is given. Dr. W. S. Barnard was the first to use this method of churning kerosene oil with sour milk and forming kerosene and milk emulsion. This is easily made but cannot be kept long, and Cook thinks it is injurious to plants, as it attracts fungi and dust and unlike soap solution would be befouling rather than cleasning to animals. Pyrethro-kerosene emulsion is given. This was first used by A. E. Menke of Arkansas Expt. Sta. This is made by using a kerosene extract of pyrethrum instead of ~~pure simple~~ kerosene oil in either formula for soft or hard soap emulsions. This emulsion is more effective to kill insects and less injurious to foliage than the kerosene emulsion. The cost of this is rather high and the extra trouble of making it are the objections. 1-12 dilution can be used with this whereas 1-12 is as strong as can be safely used with kerosene emulsion.

Experiments are given using kerosene emulsion on lice and ticks on domestic animals and for the rose chafer.

4221925 - Cutright, Clifford R.,

Subterranean Aphids of Ohio.
Ohio Agric. Expt. Sta. Bul. 387, pp. 173 - 238.

Scalecide and homemade engine oil emulsions were used against the black peach aphis at the time of planting of the peach trees. Scalecide 1-15 was used on five trees by pouring $1\frac{1}{2}$ gals. of the dilute solution about the roots of the trees. All the trees were dead by August. Home made engine oil emulsion (1-33) was used at the rate of $1\frac{1}{2}$ gals. of dilute solution per tree in the same as Scalecide. Five trees were treated, of which one died. Two of the living trees were infested with aphids, when the trees were attacked with the Aphis Sunoco oil 1-30 was poured about the roots of the rate of 1 gal. per tree. Eight trees were treated of which four died. The living trees and their checks were uninfested. Rex oil emulsion was used in the same manner as the Sunoco oil. Five trees were treated, all of which lived. There was no infestation on them nor their checks.

4421924. Davis, J.J.

Comparative Tests with dormant sprays for the control of the San Jose scale.- Jr. Econ. Ent. vol. 17, no. 2, pp.285-289.

Results for various localities:

Scalecide (1-15) 94.2 o/o dead; 80 o/o control
(based on check) 97.2 o/o ____ 100 o/o--100 o/o
100 o/o - 100 o/o; 98.4 o/o - 96 o/o 97.6 o/o 94 o/o;
100 o/o - 100 o/o; 99 o/o-96.6 o o; 99.3 o/o- 98. 8 o/o

Scalex. (1-15) 100 o/o ---100 o/o

Lubricating Oil emulsion.(2 o/o oil) - 98.2 - 97.5; 97.8-93.8; [illegible] - 93.7.

Petroleum soap (Sunoco)} 1-15) 100 - 100; 99.1 - 98.5.

Oil sprays were uniformly effective while lime-sulfur was not. Even with a 90 o/o kill with lime-sulfur the 10 o/o living scales were able to increase and incrust a living tree by fall. From these tests, general observations and further tests by Porter, D. recommends a 3 o/o spray of lubricating oil emulsion for incrusted trees or where scale are increasing. Time of application of oil sprays makes no difference in effectiveness. No recommendations are made for lubricating oil emulsion as a summer spray. Peach trees will probably be injured. Apples in foliage are not injured under ordinary conditions. Some growers have prevented scale spotting of fruit considerably by summer spraying with 2 o/o oil. D. does not recommend it however for San Jose scale summer treatment or aphid control. Only the boiled emulsion is here recommended.

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1925. Davis, [illegible] Hasemar, L.

Report on Oil Emulsions. Jr. Ec. Ent. vol. 18 no. 2, pp. 410-41[illegible].

Most satisfactory formula: Oil 1 gal., K fish oil soap 1 lb, water 1/2 gal.. Many waters require up to 2 lbs soap to maintain stability. Other formulae quite satisfactory under certain conditions were: (A) Oil 1 gal. $CuSO_4$ 1/2 lb, $Ca(OH)_2$ 1/2 lb, water 1/2 gal. (B) Oil 1 gal.. Ca caseinate 2-4 Oz; water 1/2 gal. (C) Oil 1 gal., $FeSO_4$ 1/4 lb., $Ca(OH)_2$ 1/4 lb., water 1 gal.

The V.S.C. Miscible oil (reported by Melander) is as follows:
91 o/o neutral lubricating oil, 5 o/o K. fish oil soap (30 o/o moisture) and 4 o/o crude cresylic acid. The last two are mixed to make cresoap; the oil is stirred into this without heat.

[illegible]:
The extreme limits of [illegible] oil are: Viscosity [illegible] to 250 secs at 100°F. (Saybolt), volatility less than 2 o/o; sp. gr. [illegible] to [illegible].93 at 20°C.

The best oils for scale control lie within the following limits: Viscosity 180 to 220 secs; volatility less than 1 o/o. sp.gr. 0.88 to 0.91 at 20° C.

[illegible] the are practically equal in effectiveness [illegible] of the boiled. The boiled emulsion is more stable. The cold-mixed-emulsions should be made up only as needed. Physical properties: Both boiled and cold-mixed-emulsions are very adhesive; those with oils of higher visc. are the more adhesive. The addition of Bordeaux increases the adhesiveness. A disadvantage when used on fruit. Both types of emulsions have equally good spreading qualities. They may be of value as spreaders in summer sprays at 1-1/2 to 2 gals to 200 gals of spray. Cold mixed emulsions have poor stability; the boiled emulsion is stable. Difficulty was experienced in shipping emulsions when frozen. Boiled emulsions mix well with Bordeaux, Pb. arsenate and nicotine [illegible] with lime sulphur; cold-mixed emulsion is compatible with lime sulphur.

[illegible] against insects: The boiled and cold-mixed emulsions are effective against [illegible] Scale at 2 o/o oil strength. A 3 o/o emulsion is advisable [illegible] infestations. Against Oyster shell scale 2-3 o/o oil gave variable results. 2 o/o oil gave good but variable control of green apple aphis. If applied at green tip stage results are uniform. Apple aphids are affected [illegible] are aphid eggs. Not as effective as nicotine sulfate for apple [illegible]. They injure potato plants. Satisfactory for: leaf roller [illegible] [illegible] red-banded leaf roller, all armored scales and white fly [illegible] [illegible] at 1 o/o. [illegible] at [illegible] 1 o/o. [illegible] 1 o/o, [illegible]
[illegible] fer.. on with it [illegible],
[illegible] maggot at 2 o/o, and oriental fruit
[illegible] obtained with: Apple aphids
[illegible] cottony cushion scale, [illegible]
A [illegible] blister mite [illegible]

Effectiveness of Petroleum-oil [illegible] against plant diseases:

Effective against melanose, scab and ammoniation of citrus, cherry leaf rot, apple scab, apple blotch and bitter rot, and favorable reports on peach leaf curl. Definite recommendations now possible only for citrus diseases.
Effect on foliage: Lubricating oil emulsions now recommended only as dormant sprays. It may exceptionally be used as a summer spray if San Jose Scale is serious and has not been controlled by a dormant spray and for oyster-shell scale. A 2 - 3 o/o oil is effective against red spider in summer and a 1 o/o oil for Pseudaonidia duplex and Chrysomphalus aonidum during the growing season. Peach foliage is severely injured; apple foliage and fruit more or less injured, but slight if temp. is below 90°F. Tomato and potato are badly burned. Cherry, pear, plum, gooseberry, grape, blackberry, peony, lilac, cornus, rose, walnut, maple and onion foliage were not injured by 2 o/o oil. 1-1/2 to 2 gals emulsions to 200 gals. of spray may be safely used as a spreader.

Cost: Cold mixed emulsion is slightly cheaper than the boiled. The latter is cheaper than any commercial oil preparations and one-half the cost of lime-sulfur.

1922. de Ong. J. Econ. Ent. 15, p. 339-345.
454

A discussion of the effect of hard water on petroleum emulsions is given. Soluble N_a and K. soaps react with Ca and Mg. salts in hard waters to form insoluble soaps which have no emulsifying value. Hard water must be softened by the use of a softening agent or by sufficient soap to soften the water. A slight amount of alkali in the water does not retard the action of the soap, but if in great excess, the formation of lather is checked. A method for determining the amount of soap and water softener (NaOH; Na_2CO_3) required in hard waters is given.

455 1925. de Ong. E.R. and Knight, Hugh.

Emulsifying agents as an inhibiting factor in oil sprays.

Jr. Econ Ent. vol. 18, no. 2, [illegible].

Highly refined lubricating oils were applied as sprays for red scale (Chrysomphalus aurantii) Their insecticidal value depends more on their mechanical properties than of any indirect toxicity. Any oil of sufficient viscosity to form a non-volatile film which will retain its consistency several days is effective. Anything which prevents the formation or maintenance of this film decreases ~~toxicity~~ toxicity. If in a Ca caseinate oil emulsion, the oil concentration is kept at 2% while the emulsifier is reduced from 2 % to 0.0018 %, the toxicity is markedly increased as the emulsifier is reduced. Even with 1 % oil the kill was satisfactory with the smallest amts. of Ca caseinate. In dilute whale oil-soap oil emulsions contg. 4 % oil and soap varying from 4% to 1 % there was an increased kill with a decrease in concentration of soap. With 1% soap, however, some of the scales were alive. In soap emulsions the oil droplets are surrounded with a tough elastic film of soap. The soap comes in direct contact with the insect. This accounts for the fact that it requires 4 to 6 times as much oil to kill with a soap emulsion as with a Ca caseinate or lime emulsion. If too large a quantity of Ca caseinate is used in making an emulsion, some of the oil is absorbed by the caseinate. When reduced to the minimum (about a ratio of casein to oil of 0.5 %), the oil droplets are large and break down as they pass the nozzle or on contact with any surface. An oil film is formed at once and the water rolls off. Crude cottonseed oil gives results equally as satisfactory as petroleum oil. It therefore appears that the greatest insecticidal value of an oil is obtained by applying it as nearly as possible in the form of a mechanical mixture of oil and water.

456 DeOng, E.R.
1926.

Technical aspects of petroleum oils and oil sprays. ~~[illegible]~~

Jour. Econ. Ent. Vol. 19, No. 5, pp733-745.

~~[illegible]~~---- The relation of density, flash point, distillation range, volatility, viscosity, the content of compds. which resist sulfonation and the effect of oxidation of petroleum oils to insecticidal action is discussed. Expts. on the red scale, Chrysomphalus aurantii, show that a volatile oil(kerosene) penetrates quickly throughout the tracheal system but is often expelled rapidly by the efforts of the insect. A highly refined kerosene(contg. 2-3% unsat. compds) had little toxic effect. Any volatile oil contg. large quantities of unsat. compds. seems to permeate the entire body cavity of the insect dissolving the fat bodies and finally even the entire internal cellular structure. Highly refined lubricating oils penetrate only a short distance into the main tracheal trunks and remain there indefinitely apparently killing the insect by suffocation. Lubricating oils contg. a high content of unsat. compds. hasten materially the time of death. The effects of petroleum oils upon plants are of two ~~types~~ kinds:(a) acute effects manifested by defoliation and twig and fruit injury, (b) disturbance of physiol. processes of tree and fruit. A "quick-breaking" emulsion of highly refined oil(5.75cc), water(244.12cc) and Ca-casein mixt.(0.12g) which releases the oil readily when sprayed upon foliage is described. Only highly refined oils(i.e. contg. a low content of unsat. compds.) should be used on any except dormant plants. Even moderately refined oils are hazardous when used on foliage. The advantages of the "quick-breaking" over the more stable type of emulsion are discussed.

486 1925. English, L.L.
A preliminary report on the preparation of insecticide emulsions with a colloidal clay.

Jr. Econ. Ent. vol. 18, no. 3, pp. 513-515.

x Bentonite, a colloidal clay, occurs in Wyoming, Death Valley, Calif., S. Dakota and Alberta, Canada. In crude form it comes in rather large flakes and lumps. When wetted with water it swells like gelatine and gives a soapy mixture. Chemically it is like other typical clays. 50% stock solus. were prepared by allowing the clay to swell in water over night, then adding the oil and pumping. Relative stability was ascertained by noting the separation in tubes and by centrifuging. Kerosene emulsion containing 8 and 10 g bentonite per 100 cc tap water were stable after 6 weeks. With 10 or more gm. per 100cc difficulty was had in emulsifying because of the great viscosity of the mixture. Tap water emulsions were more stable than distilled water emulsions. The tap water used contained considerable Ca, Mg and HCO_3. The addition of K_2CO_3 and $NaHCO_3$ to dist. water considerable increased the stabilty of kerosene emulsions. Paraffine oil, Red Engine Oil and furfural required less of the clay to emulsify than did kerosene (4-6 g per 100 cc for the oils; 4 g per 100 cc for furfural) Stable soap emulsions of furfural could not be made. In 2 gallon lots 4 g. bentonite per 100 cc were used for the lubricating oils and 7g. per 100 cc for kerosene. Emulsions of kerosene made with S. Carolina kaolin, Georgia kaolin, Edgar's plastic kaolin and Ky. ball clay were relatively less stable than those made with bentonite. Bentonite emulsions of paraffin and red-engine oils were more injurious to potted bean plants than kerosene emulsions or 3 commercial miscible oils. At 2% oil strength the kerosene emulsion and miscible oils caused practically no injury. Paraffin oil was slightly more injurious than red engine oil. 10 % furfural emulsion caused no injury to bean foliage, 15 % was slightly injurious, 20 % considerably so. Paraffin oil and red engine oil emulsions compared favorably with the miscible oils in toxicity to the aphid, [illegible] Aphis [illegible]

Kerosene emulsion was less effective than either. Furfural emulsion was as toxic at 15% as the other sprays at 2%. Soap emulsions were slightly more effective than bentonite emulsions. A finished bentonite which passes a 200 -250 mesh sieve / offers possibilities as an emulsifier.

405 1920-Essig, E.O.
Cal. Univ. Agric. Expt. Sta. Circ. 224, (Control of Brown apricot scale, etc).
The sprays most effective against these two scales are distillate emulsions, crude oil emulsions, and miscible oils. The Italian pear scale yields most readily to the crude oil emulsions. The commercial immersions emulsions and miscible oils are no more effective than a good home made emulsion.
Distillate Emulsions; are made from fairly heavy distillates emulsified with soap and caustic soap according to the following formulae. Distillate (27° - 28° Baume) 10 gals; caustic soda 6 lbs; liquid soap (or hard soap 12 lbs.) 2 gals; water to make 200 gals. The caustic soda not only aids in emulsifying the oils but assists materially in killing the moss on the trees. Miscible oils are usually fairly heavy oils in which a cresol soap is used as an emulsifying agent. They require more dilution than the distillate emulsions. Crude oil emulsions are made preferably from natural crude oil coming directly from the wells. A natural crude petroleum, testing about 23° Baume is preferred as it contains some of the lighter and more penetrating oils. Heavier crude oils have also given satisfactory results, even those testing 18° and lower. Formula: Water 175 gals; liquid soap 3 gals; natural crude petroleum (21° - 24° Baume) 25 gals; crude oils are annoying to the sprayer because of their heavy, sticky properties but they are the most effective and thorough of all the oil sprays. Injury may occur with crude oils which are not properly mixed or which are composed of poor material. All these oil sprays and particularly the crude oil emulsions hasten the blooming periods of the trees from one to three weeks.

406 1922. Essig. E.O. Jr. Econ. Ent. vol. 15, no. 2. pp. 181-182.
Mealy Bug Control on Pear Trees
E recommends spraying with miscible oil or crude carbolic acid and distillate emulsion.

Formula for stock solution of the latter:

Whale oil soap,	40 lbs.
Crude carbolic acid (25 o/o)	5 gals.
Distillate Oil (28°Be)	10 "
Water to make ----	50 "

Dissolve the soap in 10-15 gals. hot water; add the carbolic acid and distillate and then the rest of the water. Boil 20 minutes. Dilute 1 pt. of stock solution to 20 pts. H2O. Apply during January and February.

1901. Felt, E. P.
517 Scale insects of importance.
New York State Museum Bull. Vol. 9, No. 46, pp. 289-382.

Whale oil soap and crude petroleum combination was not as effective as a 20% crude petroleum emulsion. The crude petroleum was put on as a mechanical mixture with water by means of a kerowater pump. The 20% mixture did not appear to injure the trees to any extent, and gave good results on the scales. Crude petroleum undiluted was very injurious to plant life. Kerosene sprayed undiluted did not result in so thoro work as a 20% crude petroleum mixture and was much more injurious to the trees. A mechanical 10% kerosene mixture was an excellent summer spray when applied to young scales and it proved harmless to the trees. The R & H formula for kerosene emulsion is given. For summer work against the San Jose scale this was diluted with 9 parts of water.

529 1913. Felt. E. P.
Injuries following the application of petroleum or petroleum products to dormant trees.
Jour. Econ. Ent. 6, No. 2, pp. 160-161

This is an abstract. The use of oils and oil preparations on dormant trees has in several cases been followed by severe injury. Resistance to oil penetration probably varies with the season and from year to year. Since certain weather conditions promote oil injury, their use of oils is uncertain. Fall treatment appears to be more hazardous than Spring treatment. Felt recommends spring applications.

580

[illegible]

25 Ben Davis and Grimes Golden apple trees were sprayed [illegible] 28 and April 4, using 20-2[illegible] gals per tree. Results 47 days after:

Scalecide (1-15)	[illegible].5	[illegible] scale killed
Spra-mulsion (1-15)	[illegible]	
[illegible]		
Oil-soap emulsion		
(2 o/o oil)	[illegible].3	
Jr. Red Engine Oil		
Soap emuls. (2 o/o oil)	[illegible]	
Commercial lime-sulfur		
(32° Be, 1-8)	[illegible]	
Soluble sulfur		
(Niagara 15 lb to 50 gals. H_2O)	[illegible].5	
Dry lime sulfur		
(15 lbs. to 50 gals.)	[illegible]	
Control	[illegible].	

Lubricating oil emulsion is highly satisfactory and cheaper than miscible oils. It is sometimes necessary to double the soap in these emulsions to take care of hard waters. In these and other experiments all scales wet with [illegible] o/o oil were killed. Aphids on apple are killed with 2 o/o oil without injury to foliage. Less than 2 o/o oil will not control scale.

[illegible] Flint, W.P. and Compton, C.C.
582 Jour. Econ. Ent. vol. 1[illegible], no. [illegible], [illegible]

[illegible]

Results: Bordeaux-oil emulsion (B[illegible] lubricating oil emulsion [illegible]o/o oil) in [illegible] Bordeaux)

[illegible] of oil.	Stage of Insect	o/o Killed
1	Eggs	60
2	"	[illegible]
3	"	[illegible]
1	Half grown larvae	2[illegible].6
2	" "	[illegible]
3	" "	[illegible]
1	1/2 " "	1[illegible].6
2	" " "	1[illegible]
3	" " "	[illegible].3
	[illegible]	[illegible]
1	Full " "	0.5
2	" " "	1.0
3	[illegible]	25.

[illegible] Bordeaux-oil emulsion is not repellent to the ovipositing [illegible]

This method is less expensive than $HgCl_2$ at 1 oz to 10 gals.

[illegible] Bordeaux-oil emulsion has some effect on onion thrips.

616 [illegible]. Freeborn and Atsatt.- Jour. Econ. Ent. 11, p. 29[illegible].

[illegible] Division of Univ. of California has recommended a half and half mixture of crude oil and kerosene of 28 - 32° Be. The larvae of Culiseta [illegible] are able to adhere to the surface film in spite of the presence of [illegible] layer. Larvae were placed in tubes filled with water. Cotton plugs [illegible] them from reaching the surface. Other larvae were placed in the [illegible] water and the surface was covered with a film of kerosene. The larvae [illegible] the cotton died in 30 hours; those beneath the kerosene, in 45 [illegible]es; crude oil killed in 3 hours. Suffocation, therefore, is only a [illegible] factor in the larvicidal action of oils. The solubility of some- [illegible] from kerosene is not a factor because larvae were killed as quickly in [illegible] water as in water which had stood under a large amount of kerosene.

Larvae were allowed to draw into their tracheal systems oil which [illegible] stained with Sudan III. Upon dissection it was found that the oil had thoroughly penetrated to the finest tracheal branches and had almost ~~collapsed~~ completely collapsed the delicate walls of the larger tracheae. [illegible] smaller tracheae the intermingled drops of oil and air bubbles filled [illegible] whole diameter of the tube. Any oil, whether kerosene or a heavy petroleum can flow into the anal syphon, the main tracheae and even the very finest subdivisions and render the passage of air impossible. The mass of oil is too great to permit the passage of O2 (Cf Shafer's remarks on passage of oil through a film of oil - 1911). Death of Mosquito larvae by this means [illegible] slow however, because larvae placed in water beneath a layer of kerosene [illegible] larvae with their tracheae plugged with non-toxic petrolatum oil lived approximately the same length of time, about 4-1/2 hours. A comparison of non-toxic petrolatum and a toxic petroleum oil of the same viscosity showed that the toxic oil produced much earlier death. Suffocation by plugging the tracheae will occur but is much slower than death due ~~[illegible]~~ to other causes. Except for petrolatum and crude oil, the larvae were dead 1-2 hrs before the oil had penetrated the tissues. F & S find the volatile constituents of the oils to be the chief toxic agents. [illegible] cotton. A little of the oil to be tested was poured on the plug. Results:

Oils	o/o Volatility in 103 hrs. at 25°C.	Avg. time to kill larvae.
Gasolene	?	1[illegible] mins.
Kerosene	93.3	135 "
High Grade Stove distillate	3[illegible].4	2[illegible] "
Low Grade Stove distillate	10.6	20 hrs.
Residium (Still bottoms)	[illegible].5	72 " *
Crude	0.9	72 " *
Water-vapor only (Control)		72 " *

* No apparent ill effects at the end of 72 hours.

The curve of toxicity follows the volatility.

F and S. do not know what these volatile toxic products are. Toxicity is entirely due to the chemical characteristics of the oils [illegible] vary with almost every distillation.

[illegible]ility is a factor in toxicity because the more volatile constituents [illegible] the more toxic compounds. In oils having a b.p. less than 250°C.

[illegible]latile constituents produce the lethal effects; in oils with a [illegible] b.p. the effects of the small quantity of volatile constituents is [illegible] by the effects of stoppage, actual contact and even suffocation. [illegible] A. criticise the experiments of Moore (J. Agr. Research 10, p. 365, [illegible]7) who dealt with atmospheres containing a determined quantity of toxic substance, whereas F and A dealt with atmospheres saturated with toxic [illegible]nce. Moore also gives [illegible]ts. in Gm. mols. of Petroleum oils, but the mol. wt. [illegible]ch oils is not known. Moore and Graham's later publication (J. Econ. [illegible] 11, no. 1, 1918) shows that the highly volatile ~~factors~~ fractions of [illegible] are more toxic to insects in the vapor phase than the less volatile compares with the study of F and A.

[illegible]

636 The [illegible] dormant oil spray for killing apple red-bug eggs.

Jour. Econ. Ent. vol. 1[illegible], no. 3, p. 51[illegible]-51[illegible].

The comparison of the effects of Ca[illegible] se[illegible]te-lubricating oil (Texaco "Nabob" oil), kerosene emulsion, Sunoco oil, Hygrade [illegible]ston Spray Co.) Soluble [illegible] and lime sulfur. Ca & se[illegible]ate was made according to the formula of Burroughs (Mo. Agr. Expt. Sta. [illegible] 20[illegible], 19[illegible]), except that 1 to 1-1/2 lbs. Ca Caseinate was [illegible] F. b[illegible] gives a smoother mixture which is less liable to [illegible]. The oils generally gave better results than lime-sulfur but the [illegible] are rather confusing.

687 1910. Gillette. C.P.

Some insecticide tests for the destruction of the Aphididae and their eggs.

Jr. Econ. Ent., vol. 3, pp. 207-210.

With eggs of _Aphis pomi_; _A. viburnicola_, _Chaitophorus negundinis_ and _Melanoxantherium smithiae_ kerosene emulsion did not prevent hatching in 19 applications above 16 o/o oil, 8 above 33 o/o oil and 2 at 50 o/o oil. Less than 25 o/o oil had no effect. Scalecide, 5 to 25 o/o, was ineffective in 20 out of 22 treatments. Thompson's soluble oil, 5 to 20 o/o, was also ineffective. Although none of these oils were effective, the aphids which hatched upon twigs treated with the higher concentrate, very largely died from contact with the oil.

723 1901 - Gould, H. P.

Suggestions about Combating San Jose Scale.
Maryland Agric. Expt. Sta. Bull. 73, pp. 153 - 166.

Experiments were made to determine the effect of the different percentages of kerosene on the trees as well as on the insects during the active growth of the former. Results of these may be summarized as follows. (1) The disastrous results of spraying peach trees with a 20% kerosene mixture when they are perfectly dormant. (2) a 20% mixture of kerosene and water thoroly applied between middle or latter part of March and the blossoming period gave generally satisfactory results. (3) 5% kerosene had very little effect on the scale; 10% kills the young and some adults; 15% kills most of the insects; 20% evidently destroys all the scales with which it comes in contact. (4) 5% kerosene did not injure the foliage; 10% caused slight injury, 15 and 20% caused an increased amount of injury over the 10% but ~~it~~ not in proportion to the increased amount of kerosene. Trees that are weak from any cause are more likely to be injured by the different proportions of kerosene, than healthy trees. (5) The danger from kerosene used strong enuf to destroy scale, applied any time except when the trees are dormant, is insignificant in comparison to the danger from the scale. (6). Kerosene in a 20% mixture and stronger is much more destructive to peach trees applied when the spray will freeze to the trees than when the weather is warmer. (7) Practically the same results were obtained when kerosene was applied during cloudy weather as when applied in bright sunny weather. Crude petroleum has given conflicting results but when properly and intelligently used has been effective in controlling the scale. Either a green or amber colored oil may be used provided it has a specific gragity of not less than 43 degrees at a temperature of 60°F. It can only be used when the trees are dormant. It may be used undiluted or in 20 or 25% mixtures. The crude oil forms a greasy coating over the surface of the tree which remains for several months. Because of this coating it cannot be used as a summer treatment, as the pores of the leaves become choked.

736 1924-Gray, E.P., et al. Calif. Dept. Agr.Sp. Pub. 51, Nov. 62 P.
Emulsions and miscible oils are manufactured from kerosene, stove and engine distillates, lubricating oils, crude oils, etc., and are designed to lessen the injury to trees which the undiluted oils cause. Soap is the most common emulsifying agent. Soap emulsions are apt to be destroyed by hard water and cannot be mixed with other spray materials. Emulsions are now made with lime, blue stone, coppers, gums, starch, and other materials which contain no soap as emulsifying agents. These non-soap emulsions are not affected by hard water. The term "_miscible oil_" may be applied to a spray oil in which is dissolved a sufficient amount of soap so that an emulsion is formed when the material is mixed with water. Miscible oils usually contain a higher percentage of oil and a lesser amount of water than do commercial emulsions. Emulsions produced from miscible oils are of a higher type than those produced from commercial emulsions; i. e. the oil is dispersed into much finer droplets and the emulsions produced are much more lasting than those produced from commercial emulsions. Tables of non-soap emulsions, soap emulsions, and miscible oils are given. The density in degrees Baume and % unsulphonated residue is given under examination of separated oil. "Active ingredients" gives oil%, phenols %, soap%, and Rosin%, Under inert materials, ash (other than ash of soap)%, water % and water % by volume ~~are given~~.

1925. Gray, George P.

737 Taking the burn out of spray oil.

Calif. Dept. Agr. Weekly News Letter, Vol. 7, No. 16, Aug. 8, 1925.

A new chemical test for mineral oils used as insecticides in California orchards known as the sulphonation (sulphur) test, has been perfected and adopted by the California Department of Agriculture.

It was found that many oils which gave similar tests so far as gravity, flash point and viscosity were concerned, reacted in an entirely different way when placed on the green foliage of plants. This was due not to the physical characteristics of the oil, but to the chemical composition. There must be certain chemical compounds in oil which, when present in large amounts, cause the serious burning which results from the use of certain oils. Exhaustive chemical tests were applied to the so-called dangerous oils and it was found that those chemical compounds which are frequently referred to by oil chemists as "cracked oils" or aromatic oils, are the constituents responsible for the so-called burning of plants. These constituents are known to the consumer of gasoline through the offensive odor, to the use of lubricating oils as that quality which occasionally cuts into the bearings of engines, and to the user of the kerosene lamp through the smoke and the giving off of ill-smelling gases. In addition it was found that these compounds are frequently removed by the refiner by treating the oil with sulfuric acid. This is the basis upon which the new test, known as the sulphonation test, was devised. The test shows whether or not a particular oil contains the so-called cracked oils by the amount of the oils which are removed after treatment with sulfuric acid. In this way by working out certain standards the Department chemists are able to predict whether or not an oil will be injurious to the foliage. The manufacturer can then be informed that the use of a particular oil would cause serious damage, and the orchards of the state saved much of the injury which has resulted in the use of oil sprays in past years.

1926.- Gray, G. P., & de Ong, E. R.

738 California Petroleum Insecticides.Laboratory, & Field Tests.

Ind & Eng. Chem. Vol. 18; no.2, pp. 175-180.

Unrefined petroleum distillates are often dangerous to foliage. Experiments were made in 1915 and 1916 to determine what types of distillate were injurious and what typed uninjurious. Tests indicating the burning qualitites, illuminating power, freedom from smoke-producing substances, viscosity, etc., are probably of no significance from the standpoint of insecticidal values. Density is important as it indicates whether the oil is thick or thin. But oils of the same density may differ widely in volatility and other important characteristics. Flashpoint indicates the presence of volatile constituents and their relative volatility. An abnormally low flash point may indicate the blending of a light and heavy oil or the presence of cyclic hydrocarbons. Distillation is probably the most important test for distillates. The quantity and density of the fractions coming over at various temperatures may be ascertained. Viscosity is the freedom of motion of the molecules of an oil and an important property of lubricating oils. Sulfonation test: The important constituents of a petroleum distillate oil are the inert compounds of the paraffin series and the active compounds of the aromatic series and olefin series (cracked oils). The aromatics and many olefins ~~both~~ have greater capillarity and less viscosity, hence greater penetrating qualities but the paraffins have greater chemical activity. The sulfonation tests show quantitatively the proportions of the 2 classes of oils in refined and unrefined distillates. This method is described. Capillarity test: The capillarity of an oil is a measure of its ability to penetrate tissue. A method is given in which the capillarity of the oil is compared with that of water at the same temperature.

Laboratory and field tests were made on a large number of oil fractions in regard to their effects on plants. Effects on insects were not determined. The oils were emulsified with soap powder, as little soap as possible being used to minimize the effects of the emulsifier. The sprays were applied with a bucket pump. The lighter oils were applied at 5 to 20% oil strength; the heavier oils at 1.25 to 5%. The effect on citrus trees was noted over a period of 65 days.

Summary: Effect of oils on Valencia Orange trees. Riverside. Calif.

Oils.	Sp. gr.	Flash °F	Viscosity 20°C	%Sulfonation	Capillarity	Toxicity
Various distillates & residues including gas oil. (10 samples)	0.825-.955	57-336	1.239 - 47.589	26-87	0.030 - 0.918	Very toxic
Various distillates Including stove distillate (6 samples)	0.837-.884	101-165	1.044-1.269	22-32	0.296-0.639	Moderate toxicity
Distillates incl. several stove distillates (6 samples)	0.829 .855	97-125	1.013-1.159	17-22	0.566-0.761	Comparatively safe
Several distillates, kerosene, "Pearl oil" Squibb's heavy liquid petrolatum (7 samples)	0.797-0.891	70-397	0.961-11.0	1-20	0.678-0.844	Safe

In some experiments with undiluted oils kerosene gave very little immediate effect on foliage but caused severe root injury when it gained contact. Gasoline and "crude xylene" (a sample that contained a large amount of aromatic oils) severely burned foilage and wood.

Oils of the kerosene type (39° to 42° Be) at 20% were not injurious but 34° Be oils of this type caused a slight defoliation at 10%. Distillates of 25°-35° Be applied in excessive strengths caused a defoliation of 1-100%. Very heavy oils (15-22°Be) had a slower action than lighter oils.

Three types of injury were observed. (1) killing of the leaf tissue in 48 hrs. after spraying (gasoline, C.P.Xylene, "crude Xylene"); (2) Defoliation; leaves dropping 3-4 days after spraying but without losing color to a marked degree and stunting of the bearing wood; (3) A deposit of oil on leaves accompanied by a decided yellowing and stunting effect on all sprayed parts appearing 2-3 weeks after application and sometimes lasting for months.

A 2nd series of experiments at Berkeley Calif. in 1916 made an citrus trees, black walnut and wild morning glory (Convoluvulus arvensis) gave similar results for citrus but different ones for walnut and morning glory. "Pearl oil" (9. sulfonated) was safe on the latter plants. In general the latter plants were more susceptible to oils than citrus.

Great difficulty was experienced in placing many oils in their proper order of toxicity because more than one type of injury must be considered, also seasonal variations, etc.

Density and the sulfonation test appear to be of greatest value in determining the plant toxicity group of an oil, but much more study is needed to determine their significance. The density test is misleading: (1) If the aromatics and cracked oils have been largely removed with sulfuric acid; (2) if the oil is a blend of light oil low in aromatics and cracked oils and a heavier oil high in these constituents; (3) if the oil is a distillate from a crude high in aromatics; (4) a product composed wholly or in part of oils recovered from acid sludge; (5) a distillate from a still designed to crack the oils under pressure. The sulfonation test seems to offer the most reliable test of the probable toxicity of a petroleum distillate to plants.

1924. Green, Howard Whipple.
749

The effect of oil upon Anopheles mosquito larvae. Amer. Jr. Hygiene, vol 4, no. 1, pp.12-22

The effect of different oils on full-grown Anopheles larvae . An excess of oil placed on surface of water in each instance:

	Oil used.	Sp. gr.	Odor	Average time to kill Min.	Secs.
1.	Nujol	0.875	None	22	00
2.	Texaco engine dist.	—	—	20	00
3.	Mobile E. W.I.	.910	Paraffin	18	00
4.	Paraffin composite W.I.	.905	"	17	00
5.	Solar, Texaco	—	—	17	00
6.	Engine dist.W.I.	—	—	12	30
7.	Oil #502	.855	Distinct	12	00
8.	Field Oil Mixture	—	—	11	00
9.	Mosquito Oil Atl.Rfg Co.	.855	—	10	00
10.	Field Oil Mixture	.920		7	24
11.	Field Mixt.	—	—	6	53
12.	Field Oil Mixt	.890	—	5	40
13.	Kerosene W.I.	.805	—	4.	30
14.	Oil #503	.855	sharp	3.	48
15.	Kerosene Texaco	—	—	3	17
16.	Refined fuel oil W.I.	.985	—	2	02
17.	Gasolene W.I.	.725	—		12

Conclusions: 1. The oil film causes Anopheles larvae to die by suffocation due to a mechanical barrier which prevents them from reaching outside air. They live the same time when prevented from reaching air by mechanical means as by a film of non-toxic oil like Nujol.(This was not true of all larvae but of the majority. See Table. 9.) . 2. They also die by suffocation due to the oil entering the breathing siphon ⟶ sufficiently to block the passage of air. They die in the same time after exposure to a film of Nujol for 53 secs., as when exposed for 22 minutes, showing that the oil which entered the siphon in 53 secs. suffocated the larvae as quickly as if they had been suffocated by mechanical mean . The heavy oils do not enter the siphon to any extent (this was apparently not proved by examination of larvae.C.H.R.). 3. Anopheles larvae are killed by the volatile portions of oils which penetrate the tracheal tissues (Cf table above). When exposed to the volatile portion only they die in a short time. The rapidity with which they die depends upon the volatility and toxicity of the oil. When an excess of oil #503 is used they die in less than 4 mins. but when only 3cc per sq. ft. is used double the time is required. Theoretically, two slightly toxic oils possessing equal toxicity cause death in different lengths of time provided their sp.gr. are different. The lower the sp.gr. the shorter the time necessary to kill.. The fatal dose is obtained in a short time: For gasolene, less than 1 sec.; Texaco engine distillate less than 2 secs. For all light oils the time is probably small. For Nujol it is less than 1 min. The larvae do not obtain a fatal dose of oils so heavy that they do not enter the breathing siphons. Increasing the length of exposure to oil does not seem to decrease the length of life of the larva. When used in excess all light oils are therefore approx. equally effective, although longer

times may be necessary to kill with some than with others. If less than an excess of oil is used other factors alter the effects produced. Culex larvae require a much longer time to die than Anopheles larvae. A fuel oil mixture which kills Anopheles in 11 mins. requires 72 mins for Culex. Anopheles larvae are suffocated in 12 mins. while Culex larvae require 6-8 times as long.

1923. Griffin, E.L.
752 The Constitution of Oil Emulsions.
Jr. Econ. Ent. vol. 16, no. 5, pp. [illegible].

(Cf. E. Griffin. J. Amer. Chem. Soc. 45, p. 1648 (1923).)

The fate of the soap in the process of emulsification is as follows:

1st a portion is hydrolyzed into alkali and fatty acid; the fatty acid

dissolves in the oil and the alkali in the water. 2nd. a portion of the soap forms a film of uniform thickness around the oil droplets; 3rd, the remaining portion of the soap is dissolved in the water. The hydrolysis of the soap proceeds till equilibrium is reached between the free alkali in the H_2O and the fatty acid in the oil. The soap thus hydrolysed is a total loss. This loss can be prevented by adding sufficient alkali to prevent hydrolysis of the soap. This is in agreement with the work of Briggs & Schmidt (J. Phys. Chem. 19, p. 478-499) (1915). The fish-oil soap recommended by Quaintance and Siegler (USDA Farmers Bull. 908)1918) contains an excess of alkali and is well suited for emulsification. The soap film which surrounds the oil droplets in an emulsion has the thickness of the length of a mol. regardless of the concentration of soap in the solution from which it is formed. 1 g. soap will cover an area of 500-1000 sq. meters, depending on the kind of soap. A very good commercial emulsion (66 o/o oil) had droplets of 0.0003 cm. ~~xxxxxfxsix~~ in diam; equivalent to 2 sq. meters per c.c. of oil dispersed. 1 g. soap on this basis will form the film for 375-750 cc of this emulsion. In emulsions in which the oil droplets are larger, less soap is needed. If the emulsion contains 66 o/o oil and droplets average 0.001 cm. in diameter, 1 g. of soap would form the film for 1250-2500 cc of the emulsion. If insufficient soap is present to form the films, the oil droplets will coalesce and separate out. But it is possible to ultilize nearly all the soap in the formation of the film. The soap in solution in the water does not stabilize the emulsion but increases the wetting and spreading qualities of the spray. The surface tension of water is greatly lowered by the addition of small quantities of soap, but larger quantities do not effect it ~~proportionately~~ proportionally.There is probably an optimum concentration of an excess soap to be used in an emulsion. In a kerosene emulsion(made according to Farmer's Bull. 908) which contained 1.80 o/o dry Na fish oil soap, 8 o/o of the soap was lost by hydrolysis and solution in the kerosene, 12 o/o was used to form films about the oil droplets, 80 o/o remained in the H_2O. A similar emulsion to which 30 cc per L. of N NaOH was added showed 9 o/o soap used to form films and 91 o/o in the aq. solution. No hydrolysis had taken place.

765 1925. Hacker, H. P.

How Oil Kills Anophiline Larvae. F.M.S. Malaria Bureau Reports, Vol. 3, 62 p. (London).

GENERAL CONCLUSIONS.

(1) Differential wetting has been shown to be an important factor in the life-history of larvae, and in their susceptibility to the effects of oil.

(2) Anopheline larvae place themselves at right angles to a wet object because their tails are wet and their spiracles are dry. The larvae lie parallel to a dry object because their dry spiracles are "attracted".

Oil on the surface of water acts like a dry object and "attracts" the spiracles. When contact takes place the oil is able to wet the spiracles and therefore enters the breathing tubes. Contact with oil is sufficient to kill larvae, and the appearances shown by oil in the tubes have been described.

(3) A 0·1 per cent. solution of soap is able to wet the spiracles so that the larvae can no longer rest at the surface and ultimately drown.

(4) Weak emulsions of oils do not enter the breathing tubes and kill larvae unless there is a film of oil on the surface. Wet oil does not "attract" the spiracles of larvae.

(5) The spread of oil and the movement of thymol particles depend on the affinity of water for active groups in the substance. Both may be prevented by satisfying this affinity by saturating the water with a material containing an active group.

(6) Pure hydrocarbons do not spread on water. Oils that spread contain substances which have active groups, and these substances have an affinity for the oil on one hand and for water by means of their active groups on the other.

If the oil contains too much active material the excess leaves the oil, satisfies the affinity of the water for active groups, and thereby prevents the oil from spreading.

Crude oil has been shown to be a satisfactory mixture because it does not contain an excess. A method of testing whether any given mixture contains too much active material has been described.

(7) Methods for comparing the spreading powers of oils have been suggested. One of these depends on the amount of oil which must be added to pure paraffin in order to make the mixture spread. The other is based on the extent to which inactivated water must be diluted with fresh water before the oil can spread.

(8) The substances which cause spreading are increased by oxidation.

(9) Pure hydrocarbons are able to wet the spiracles. They can thereby enter the breathing tubes to kill larvae.

Volatile hydrocarbons condense as a film on the lining of the breathing tubes and produce a pseudo-anaesthetic effect.

This film increases the absorption of alcohols and thereby enhances their toxic action, which is a true anaesthesia.

(10) The toxicity of kerosene is increased by oxidation in the same way as the spreading power. The toxicity and the spreading power are therefore probably due to the same substances.

1924 - Hamilton, C.C.

779

Control of the European Red Mite.
Maryland Agric.Expt.Sta.Bul. 264, pp. 181- 238.

Several types of oils were used in both laboratory and field tests. The first group consisted of oils of an asphaltum base made miscible by the addition of a sulphonated vegetable oil and containing up to not more than 7% water. The second group consisted of asphaltum base oils made miscible by the use of carbolic acid. The third group consisted of oils of a paraffin base made miscible by the use of a carbolic acid soap and containing not more than 7% water. The fourth group consisted of lubricating oils of a paraffin base, made miscible by use of a soap, usually fish oil soap, and containing 33 to 35% water. Comparing the oil sprayed in the laboratory tests according to the percentage of oil in the different dilutions, the best control was obtained from lubricating oil emulsions made from a paraffin base oil and emulsified with fish oil soap or a similar soap. The next best results were obtained from the oil sprays made from a paraffin base oil and emulsified by a carbolic acid soap. Very little control was obtained with the oil emulsions made from cotton seed oils. A combination of cotton seed oil and lubricating oil gave good control in all dilutions except those containing less than 2% oil. Field tests were made with 9 commercial brands of oil sprays and one home mixed emulsion in the spring of 1923. Dilutions of 1-15, 1-25, 1-35 and 1-45 were used. Results showed that oils which gave poor control in the laboratory gave poor control in the field tests. Comparing the sprays on the basis of the kind of oil used and the percentage of oil contained in the different dilutions, the field control agrees very closely with the laboratory tests. The lubricating oil emulsion made miscible with soap uniformly gave the best results, although several other oils gave excellent control. No injury to the trees resulted from the use of any of the oil sprays. The winter eggs of the European red mite can be killed only by the use of oil sprays. Kerosol, and kerosene emulsion have proved ineffective. Spray injury was noted in one block of trees sprayed with Scalecide. The spraying was done on a slightly windy day, with a temperature of 40oF. That night the temperature dropped to 19°F. The maximum temperature the next day was 33°F and a minimum that night of 13°F. This injury was due to the cold weather following the spray. Other parts of the orchard sprayed the day before the 40°F temperature and that sprayed afterwards showed little or no injury.

1923 - Haseman, L., & Sullivan, K.C.

795

Controlling San Jose scale with lubricating oil emulsion.

Missouri Agric. Expt. Sta. Circ. 109.

While liquid lime sulphur has given satisfactory scale control, certain oil emulsions have usually given a slightly higher kill. Coal oil emulsion and certain miscible oils have given effective results. Scalecide has also given good results. Up to the present time the oils used in making lubricating oil emulsions have been called red engine oils. These are cheap lubricating oils with a paraffin base. Diamond paraffin oil, red engine oil, nabob, and 180 red neutral have given good results. The soap used is a potash fish oil soap. Ordinary fishoil soap will not give good results. The following formula is recommended by the U. S. D. A. Paraffin lubricating oil 1 gal; potash fish oil soap 1 lb. soft water ½ gal. The soap, oil and water are placed in a vessel and brot to a vigorous boil by placing over a fire or by using live steam. While still hot the solution is passed thru a force pump at least twice under at least 60 lbs. pressure. Ordinary stirring is not sufficient. After the solution is thoroly emulsified it will keep indefinitely providing it does not freeze. It will freeze at 18°F and freezing breaks down the emulsion. A 2% solution of oil will give efficient results. The emulsion is used 3 gals. to 100 gals. of water. In case hard water must be used a stablizer can be added which will prevent the emulsion breaking. One half gal. of water containing ¼ lb. copper sulphate and ¼ lb. lime will soften 50 gals. of water.

1924. Herbert, F.B.

810

Spray Stimulation.- Jour. Econ.Ent. 17, no. 5 p. 567-572

Petroleum oil sprays often hasten blooming and ripening of fruit more than other sprays. This is noticed in the heavier emulsions and miscible oils but seldom with kerosene or distillates. The latter evaporate so quickly that they disappear before the tree is benefitted. Miscible oils produce greater stimulation than ordinary emulsions. The stimulation is partly due to the emulsifiers. Mineral salt or colloidal emulsifiers do not produce the stimulation obtained with cresylic acid emulsifiers of miscible oils. Stimulation depends upon other factors, such as soil moisture and plant food, and time of application. Advantages and disadvantages to trees are cited.

1921. Horne, W. T. and Essig, E. O.

854 Plant disease and pest control.

× Univ. Calif. Agr. Expt. Sta. Circ. 227. 69 pp.

The use of crude petroleum is almost entirely limited to the winter spraying of deciduous trees when the buds are entirely dormant. It is practically the only spray treatment which has been effective against the European or Italian pear scale and will destroy the winter eggs of many of the aphids, of the red spider and of some of the defoliating caterpillars. A natural crude petroleum testing 23° Be is preferred. A crude oil emulsion is prepared as follows: Water 175 gals, liquid soap, 3 gals, natural crude petroleum (21°- 24°Be), 25 gals.

Petroleum distillates have had wide use as insecticides. Kerosene, of about 40°Be. has been used in the form of an emulsion. The cheaper, unrefined distillates have replaced kerosene as a foliage spray.

The following kerosene emulsion spray is recommended for use on citrus trees:

Kerosene	15 gals,
Liquid soap	3/4 gal.
(or hard soap	5 lbs.
Water	200 gals.

Certain "tree" distillates, testing 31° to 32°Be. said to be selected and partially refined, have lately displaced to a considerable extent the heavier distillates of 27° to 28° for use on citrus trees.

The following formulas are given:

Tree Distillate emulsion:

Tree distillate (31° - 32°Be)	4 gals.
Liquid soap	3/4 gal.
(or hard soap	5 lbs.
Water	200 gals.

If the distillate is used without soap, the following formula is used:

Tree distillate (31°- 32°Be)	4 - 6 gals.
Caustic soda (95%)	7 lbs.
Water	200 gals.

Heavy Distillate Emulsions for use on olives:

Distillate (28° Be)	7 gals.
Caustic soda (95%)	5 - 7 lbs.
Water	200 gals.

For use on dormant deciduous trees, the following is recommended:

Distillate (27°- 28°Be)	20 gals.
Fish oil soap	30 lbs.
Water to make	12 gals.

Commercial emulsions and miscible oils are no more effective than a good home made preparation, and are only more convenient.

861 1907 - Houghton, C.O.

Orchard tests of miscible Oils.
Dela. Coll. Agr. Expt. Sta. Bul. 79, Part II, PP.35-40.

Apple trees were sprayed with emulsions made according to four formulas, as follows: Formula A: "Soap Solution" (Formula No. 28) 9 Gals., water 7½ gals., crude oil 20 gals., rosin oil 5 gals. Formula B: Soap solution (Formula No. 28), 9 gals., water 6¼ gals., crude oil 20 gals., paraffin oil 10 gals., rosin oil 6 gals. Formula C: Soap solution (Formula No. 28) 9 gals., water 1¼ gals., paraffin oil 40 gals., rosin oil 6 gals. Formula D: Soap solution (Formula No. 28) 9 gals., water 4 gals., crude oil 10 gals., paraffin oil 10 gals., Kerosene 10 gals., rosin oil 3 gals. 30 trees were sprayed with each emulsion about a gallon of spray material being applied to each tree.

Conclusions: A miscible oil made according to any of these formulas was an effective insecticide for the San Jose scale if at spray strength it contained about 10% oil. Of the various miscible oils prepared at this Station the one made according to Formula C, probably is the most effective for San Jose scale. It will probably be effective when used at less than 10% oil strength. All the emulsions or miscible oils thus far tested when applied to trees in leaf injured the foliage seriously when used at a strength necessary to kill the majority of the adult scales. A miscible oil made up with any of the "emulsifiers" discussed in Bul. 75, or in the present bulletin, and kerosene alone proved ineffective in controlling the San Jose scale unless the emulsion, as applied to the trees, contains about 20% oil. A miscible oil similarly made up and applied, but containing crude oil instead of kerosene proved more effective in controlling the scale.

1900. Howard, L. O.

889 Progress in economic entomology in the U.S.

U.S.D.A. Yearbook 1899, pp.135-156.

The insecticidal properties of pure kerosene have long been known. Lodeman has shown that kerosene was recommended for the destruction of scales on orange trees in 1865, and was also successfully applied to oleander, sago palm, acacia, and lemon trees. This was greenhouse work as the oil was applied with a feather. Mr. Wm. Saunders, of the Dept. of Agr. in 1878, used a mechanical mixture of kerosene and water in greenhouse work for many years. Mr. George Cruikshank of Whitingsville, Mass., used a mixture of kerosene and whale oil soap as early as May, 1870, practically producing an emulsion (Gardeners Monthly, 1875, p.45), Henry Bird of Newark, N.J., in 1875, made a mixture in which he used a little kerosene oil with strong soapsuds, finding that it combined readily, and could be applied uniformly with a syringe. In 1878 A. J. Cook recommended a mixture of kerosene oil and soapsuds. In 1880 W. S. Barnard, working for the Div. of Ent. made a stable milk emulsion with condensed milk, which was used successfully against scale insects on orange trees and in 1884 the same investigator originated by experiment the standard kerosene-soap emulsion, now commonly known as the "R & H formula". Cook, working in Michigan, arrived at a different formula. The kerosene-soap emulsion was speedily adopted and has become the most used and most reliable insecticide against all sucking insects.

1925. Huber, L.L.

904 Some Spray Tests with Oil emulsions.

Jr. Ec. Ent. vol. 18, no. 3, pp. 547-548.

The greatest single factor affecting the viscosity of an emulsion is the vol. ratio of oil and water. There is an optimum proportion. A deficiency of soap results in lower viscosity due to the prevalence of larger oil globules which have a tendency to break the soap film and coalesce. Size of globules is dependent on the temperature of the mixture when agitated. But continued application of heat gains nothing. The amount of heat applied affects the oil concentration. Heating facilitates emulsification by lowering the viscosity of the mixture and reducing the interfacial tension between the oil and water phases. The degree of mechanical agitation also affects viscosity. Within certain limits the more often the mixture is pumped and the greater the pressure, the more viscous the product. This is due to reduction of globule size which in turn increases the extent of the oil-water surface. These factors have an important influence on the % of oil in the diluted emulsion since they affect the volume of the concentrate.

Two tables are given on the effect of various oil concentrations on San Jose Scale.

1908-Jarvis, C.D.

934 Conn.(Storrs) Agr.Exp.Sta.Bul. 54, pp. 169-197.

Demand for a substitute for lime sulphur is large because of undesirable handling qualities, and difficulties of preparation. Commercial miscible oils have come into large use but are too costly. Oil sprays are more efficient than lime sulfur because of better spreading and penetration. From the standpoint of safety, experience with oil sprays is more limited, but commercial preparations have been widely used and have given no injury from either fall or spring applications. Even pure petroleum is being applied without injury. A culminative effect on trees seems improbable. The slight traces of oil residue observed 6 weeks after the application of commercial oil preparations is probably consisting of vaseline. But many of the oils used in commercial preparations have had the vaseline extracted. The home made oil emulsion costs less than lime-sulfur and with proper materials is more convenient to make. It is easier on the spraying equipment than lime-sulfur but is destructive to rubber hose. It is best to use canvas-covered or wire-wound hose and to rinse thoroughly after use. Oil preparations seem to have an invigorating influence, especially on pear, the extent of which has not been determined. The term "miscible oil" is more appropriate than "soluble oil" because the addition of H_2O is a mixing rather than a dissolving process. When water is added, the miscible oil breaks up into fine particles; under certain conditions these particles may reunite and present the same condition as formerly. These emulsions are very stable often remaining in perfect condition for a year or more. After standing a day or two a thick creamy layer forms on top.

Preparation: The preparation of the emulsifier is as follows: Carbolic acid (liquid crude 100%) 2 qts., menhaden oil 2½ qts., KOH (granulated) 1 lb. Heat to 300°F. in a covered kettle not over half full to prevent loss by foaming, remove from

Contains about 75.5% petroleum oil largely paraffin oil

fire and immediately add the 2½ qts. kerosene and then 5 qts. of water. Do not reverse this order. This claret-brown, somewhat stringy liquid keeps indefinitely. To make the complete miscible oil mix the following: emulsifier 8 pts., paraffin oil (a heavy fractional distillate of crude petroleum commonly used as a lubricant, (28° Be) 35 pts., rosin oil (any grade) 5 parts, water 1 part (more if necessary). Stir vigorously after mixing. When 1st stirred it sounds harsh but soon becomes thicker and smoother. Test by mixing in water. Crude oil may be used but is variable in quality and often contains refuse that interferes with the making of a good miscible oil. This refuse may be filtered out. With crude oil the rosin oil may be reduced to 4 parts and the water increased to 2 parts or more if necessary. As much as 45 pts. of paraffin oil may often be used. Always determine by experiment how much paraffin or crude oil can be used before making a large batch.

Materials: Use only 100% crude liquid, dark carbolic acid, unadulterated fish oil, and good commercial KOH. Dilution for spraying: 1-15 is recommended for dormant spray; 1-18 has given good results. As a summer spray for crawlers: 1-35 for apples and pears; 1-40 for peaches and plums. Weather conditions influence the degree of tree injury. Trees in foliage sprayed with a strong solution on a cloudy day were less injured than those sprayed on a clear day.

5% oil

Preparation	Concentration	General efficiency
Carbolune	1-20	100%.
"	1-15	100%
Jarvis spraying compound	1-20	96
"	1-15	100
Killpo-Scale	1-20	90
"	1-15	98
Orchard Brand	1-20	95
"	1-15	100
San-U-Zay	1-20	64
"	1-15	100
Scalecide	1-20	90
"	1-15	100
Surekill	1-20	79
"	1-15	100
Target Brand	1-20	89
"	1-15	100
Home-made miscible oil	1-20	97
"	1-15	100

Based on small counts, most of them less than 200 scales.

1898 - Johnson, W. G.

947 Report on the San Jose Scale in Maryland, and Remedies for its Suppression and Control.

Md. Agric. Expt. Sta. Bul. 57 - 116 p.

The results of using pure kerosene emulsion, and kerosene emulsion diluted in various ways, and kerosene mechanically mixed with water, show that kerosene in any form could be used cautiously. Pure kerosene cannot be safely recommended as a spray for young or bearing fruit trees at any time of the year. Very old trees of certain varieties, resist the destructive effects of pure kerosene more than younger bearing trees, a condition no doubt due to the fact that the wood of the very old varieties is firmer and more mature and thus resisting the penetration of the kerosene. From 80 to 100% of the fruit buds are killed on bearing trees, whether sprayed in the fall, midwinter or spring. Young trees especially peach and plum, are seriously injured or killed. Pure kerosene emulsion or kerosene diluted in any form cannot be recommended until further experiments are conducted. Beware of mineral oils on fruit trees. The kerosene undiluted killed all the scales but was very injurious to the trees. Kerosene diluted was made by using 1/2 lb. soap, 1 gal. water, 2 gals. kerosene. This was put on without dilution and diluted. Experiments with this emulsion gave varying results in regard to the killing of scale but did not hurt the foliage in any way. Gasoline pure and diluted may be used on plums when buds are opening without injury to the tree, but it destroys a very small percentage of the scale.

1910-Jones, P.R.

954 Papers on deciduous fruit; Insects and Insecticides; Tests of sprays against the European fruit lecanium and the European pear scale. USDA Bur. Ent. Bull. 80, pt. 8, pp. 147-160.

The following sprays were used against the European fruit lecanium. (1) 6% distillate oil emulsion. This was made by dissolving 30 lbs. of fish oil soap in 12 gals. of hot water and pouring the mixture into the spray tank with 20 gals. of distillate oil (28° Be). This mixture was agitated thoroly and sprayed into other containers at about 150-180 lbs. pressure, giving a thick creamy emulsion of about 55% oil strength. The fish oil soap solution was made by the following formula. Water 6 gals. lye, 2 lbs., and fishoil 1½ gals. A 6% distillate emulsion was made by using 5½ gals. stock to 44½ gals. of water. 1 lb. of caustic soda was used to soften the water. (2) 5% distillate oil emulsion and caustic soda. This was made by using 4½ gals. of stock, 5 lbs. caustic soda and 45½ gals. of water. (3) 6% distillate oil mechanical emulsion. This was made by using 3 gals. of distillate oil (28°Be), 1 lb. caustic soda, and 47 gals. of water and agitating violently for 5 minutes before application. (4) 12% crude oil emulsion. Fish oil soap 5 lbs., lye 1 lb., crude oil 6 gals. water 43 gals. This formula makes 50 gals. The crude oil was pure "Coalinga special", crude petroleum 16° to 22° Be. with an asphalt base. The distillate and crude oil sprays were effective against the scales and cleaned the trees of lichens. They did not injure the buds or the bark of the tree and seemed to possess fungicidal properties. Practically the same results were obtained when these sprays were used against the European pear scale.

1914. Jones, P. R.

955 Oil Sprays. Five years' successful use.

Better Fruit, Vol.8, No. 7, pp.33-38.

The heaviest oil preparations probably kill insects in 2 ways: By forming a smothering blanket over insects such as scales and by the more volatile portions penetrating the spiracles. The vapors or gases probably give the first action which is like an anesthetic. Higher gravity oils like the kerosenes & products like xylol probably penetrate the spiracles, dissolving the fats and paralyzing the nerve centers. Insecticides of this type act much more rapidly than those made from crude oil or crude oil residums.

Several types of oil have been used in eastern and western U.S. Crude oil direct from well; fuel oil (a topped crude oil), stove distillate; gas distillate; lubricating distillate; kerosene. Mixed oils have often been used. Entomologists know little about the oils they use; the oil companies know nothing about the oil that is best adapted for emulsions and whose physical characteristics are suitable for insects and safe for trees.

Three types of oil mixtures have been employed: Mechanical mixtures, mechanical emulsions and emulsions of the miscible oil type.

Mechanical mixtures are mixtures of oil and water at high pressure. Distillates of 28-34° Be and crude kerosenes have largely been used for this purpose. The oil separates out on the tree in this type of mixture and injury is likely to follow. It is considered dangerous to use.

Mechanical emulsions consist of oil emulsified at high pressure with a certain quantity of whale-oil or fish-oil soap in hot water. The stock emulsions generally contain 50-66% oil and are diluted according to use. The oils used are mainly kerosenes, distillates of 28-34° Be and crude oils although the latter generally form a stock that is too thick for use. Sometimes distillate and crude emulsions are made on the farm for immediate use by dissolving a certain quantity of whale-oil soap, liquid soap or oleic acid and an alkali in water in the spray tank and adding the oil slowly while the agitator is running. While these emulsions are much preferred to mechanical mixtures of oil and water, they will not stand from one season to the next and are broken down by heat or break on dilution.

Miscible oils include all soluble oils or oils miscible in water. In the East the mixtures consist mainly of paraffin base oil and vegetable oil (linseed, etc.) and some of the creosote oils. The amount of water present has a marked influence on the ability of the mixture to mix readily with water. Sometimes a few drops of water decide this. In the West, miscible oils are generally made of a petroleum oil, a vegetable oil ("like whale oil or fish oil") and sometimes a creosote oil or a preparation of carbolic acid or cresylic acid (cresol), the latter being much better and more commonly used. The Western process is preferred to the Eastern because the substances used are safer on trees and by using 98% cresylic acid instead of low grade creosote oil tree injury is avoided and a more perfect product is obtained. The various oils require different soaps for emulsifying or making them miscible in water. The oil should be selected for the insect and type of tree to be sprayed.

The writer has not seen a single case of bad oil injury in the West, due, he believes, to the fact that Western oils are made of asphalt base products whereas in the East paraffin base oil is used; the latter is more penetrating and does not form so stable an emulsion or miscible oil. Furthermore, the eastern process of using linseed and creosote oils in the miscible oils renders the product more liable to injure trees. Another factor well known among oil men is that eastern oils run much higher in gravity than those in the west, i.e. eastern gasolines 4-6° Be higher; eastern kerosene and even crude oils are higher. Therefore the same type of oil in the east will give more penetration and is more liable to injure than the same type in the west. The writer makes an error in stating that Western oils contain more saturated hydrocarbons (i.e. xylol, toluol, cumol) whereas the eastern oils are less stable.

The writer has used western oils at 2-15% strength without injury. In the Santa Clara Valley pear orchards have been dormant sprayed for 10-12 years without injury.

The writer has noticed the stimulating action of oil sprays on young and old pear trees sprayed during winter and spring. The sprayed trees bloom earlier and bear heavier crops than the unsprayed trees.

Costs are considered.

Nicotine sulfate sprays are improved by the addition of an oil emulsion which reduces surface tension of the liquid and gives greater penetration.

1925 - Leach, B.R.

997 Control of Japanese beetle in lawns.

Penn. Dept.Agr. Gen. Bul. 410; (Vol. 8, no.14); 12 p.

Two carbon disulphide are given each having special merits.

Emulsion #1: 10 parts by volume of CS_2, 1 part by volume of cold water soluble rosin fish oil soap and 3 parts by volume of water. The emulsion is prepared in a churn as follows: The soap and water is placed in the churn and the handle is turned to obtain an even mixture. Then the CS_2 is added and the handle is turned until the mixture emulsifies as indicated by the change in color and the creamy-like consistency of the liquid. This emulsion will separate or stratify upon standing for any length of time and must be thoroly shaken before using.

Emulsion #2: A soap solution is made as follows: To 135 cc of 7% sodium hydroxide solution, add 50 gm. of powdered rosin. Then add 450 cc of water and agitate thoroly. Add 50 cc of oleic acid and agitate thoroly. Thirty parts of the above soap mixture is added to 70 parts pf CS_2 and the mixture agitated in a churn until emulsification occurs.

This emulsion separates and stratifies only very slightly when stored.

A special machine is used for treating turf with the emulsion. It is based upon the principle that a stream of water flowing under pressure thru a pipe is capable of creating a suction. The water from a hydrant enters the machine and shoots across an enlarged chamber and out thru' a pipe. A small tube is attached to this enlarged chamber. This tube extends down to the containers holding the emulsion. The emulsion is drawn up into the chamber by the suction created by the stream of water. The amount of emulsion entering the chamber is regulated by a ~~[illegible]~~ needle valve. 1 qt. of emulsion is used for 50 gals. of water passing thru' the machine.

1917. Lees, A. H.

1000 Accessory Wetting Substances With Special References to Paraffin Emulsions.

Ann. Applied Biol., Vol. III, No. 4, pp.141-149.

Paraffin emulsions = kerosene emulsion as used by this writer.

Soap increases wetting power but no quantity of soap will enable a liquid to wet such waxy colonies as those of woolly aphis.

Pickering (6th Rpt. Woburn Expt. Fruit Farm 1906) has shown the great diversity in kerosene emulsion formulas. The proportion of oil to soap may be as great as 100:1.2 or as low as 100:240.

With water of 12° hardness at least 0.5% soft soap is required to render the emulsion stable.

Wetting with kerosene emulsions can be obtained in 2 ways: (1) If oil-soap ratio is low, wetting is due to the aq. solution; (2) If this ratio is high, wetting is due to oil. Wetting with oil should be avoided as it will cause burning.

Wetting power: Wetting power of emulsions containing 0, 1, 2, 5, 10, 15, 20 and 25% kerosene and 0, 5, 1, 1.5 & 2% soft soap, emulsified several times, without heat, in garden syringe, was tested on a glossy "American cloth" (oil cloth) surface. A drop or two of the liquid was placed on the oil cloth and made to roll. If it spread immediately and formed a thin stable aqueous film, it was given 3 marks for aqueous wetting; if it spread but would not form a stable film, 2 marks; if it wetted only slightly, 1 mark. If it left a faint trace of oil, 1 mark for oil wetting; a definite oil spot, 2 marks; an extensive oil spot, 3 marks.

Results: When oil wetting rises above zero, the mixture probably burns foliage.

As the per cent soap is increased, the amount of oil that can safely be used on foliage increases. This is shown as follows:

Tap water (12° hardness).		Distilled Water.	
Per cent oil	Per cent soap required	Per cent oil	Per cent soap required.
(Unsafe at any per cent)	0.5	1-5	0.5
1	1.0	15	1.0
10	1.5	20	1.5
25 (except for tender foliage).	2.0	25	2.0

The results with 0.5% soap in distilled water which are intermediate between those with 1 and 1.5% soap in tap water indicate that with water of 12° hardness, about 0.75% of the soap is consumed in ppting. salts that cause hardness. This is about 3/4 lb. soap per 10 Imp. gals. of mixture.

Stability of emulsions: All kerosene emulsions will de-emulsify on long standing. If decided breaking is going to set in, it will do so in the first hour after preparation. Results: Emulsion containing 0.5% soap in tap water de-emulsify on standing 1 hour, those containing 1.5% soap and tap water and 20-25% oil de-emulsify on being sprayed. Those containing 2% soap are stable.

Accessory Wetting Substances With Special References to Paraffin Emulsions (Continued).

Wetting Power of Various Fluids.

Substance	Gooseberry leaf.	Sea-kale Leaf.	Amer. Gooseberry Mildew.
Water	Nearly complete	None	None
Gelatin (1-1000)	Complete	Very slight	"
" (1-10,000)	"	"	"
Casein (1-1000)	"	"	"
" (1-10,000)	"	"	"
Soap 0.5%	"	Slight	"
" 1%	"	Nearly complete	Very slight
" 2%	"	"	"
Emulsion Soap 1% Kerosene 1%	"	"	Moderate
Emulsion Soap 1.5% Kerosene 1.5%	"	Complete	Nearly complete
Emulsion Soap 2% Kerosene 2%	"	"	Complete
Emulsion Soap 1% Kerosene 5%	"	Wets by oil but not by aqueous solution.	Moderate.
Emulsion Soap 2% Oil 1%	"	Complete	Moderate.

Emulsions were better spreaders than soap solutions.

Kerosene emulsion is recommended as a carrier for other spray materials (Livers of sulfur; nicotine).

1900 - Lowe, V. H.

1018 San Jose Investigations II, N. Y. Sta. Bul. 194, pp. 369 - 384.

In a series of winter spraying experiments with refined (150° fire test) kerosene oil, peach trees were killed with one application of a 20% mixture of oil with water; and plums seriously injured with a 40% mixture. Pears and apples were not injured except by the pure oil and then only slightly. The 20% mixture of kerosene had no apparent effect on the San Jose scale but the 40% proved effective in ~~xxxxx~~ every case. Summer applications of 100° and 150° fire test oil showed the former to be dangerous, burning the leaves at a percentage too low to kill the scale; while the latter did not injure the foliage except when applied undiluted. Crude petroleum should not be less than 43°Be at 60°F for use as an insecticide. Oils of lower specific gravity were found to be dangerous to the trees. Crude petroleum can be applied pure or mixed with water. If mixed with water use a mixture containing 40% oil. Late winter and early spring is the best time to apply the oil. Summer applications should be avoided. Peach and Japan plum trees are more susceptible to injury than European plums, pears and apples.

1896 - Lowe, V.H., & Sirrine, F.A.,

1020 Report of the Entomologist. N. Y. State Agric. Expt. Sta. Rpt., 1895; pp. 549-633.

Reference is made to the use of kerosene emulsion for corn worm destruction by S. M. Tracy of the Miss. Agric. Coll. in the U. S. Agricultural Report for 1888, p. 143. Kerosene emulsion was tried on the plum lecanium. It was made by dissolving ½ lb. of either common or whale oil soap in 1 gal. of soft water. Heat the mixture to boiling and remove from fire and add to it 2 gals. of kerosene. The whole is mixed by pumping thru a force pump. This was diluted 1-4, 1-6 and 1-12 and a kerosene emulsion made with milk, was put on 1-4 and 1-6. The 1-4 and 1-6 strengths apparently killed all the scales, while only traces of scales survived the other dilutions. A spring treatment was made with dilutions 1-15 and 1-9, with very little effect on the scales. A summer spray with a dilution of 1-6 killed about 80%. The foliage doubtless prevented a higher kill. Emulsions made of crude petroleum, diluted with 16 parts of water to 1 part emulsion was tested on a green plant louse on tomato plants. About 75% of the aphids were killed and all the plants were injured. Winter washes of kerosene emulsion 1-2 and 1-3 were used on 3 and 4 year old peach trees. All the scales were killed. For summer washes only kerosene and crude petroleum emulsions were tested. The kerosene emulsion was applied July 2nd, 12th and 22nd diluted 1-10. The crude petroleum emulsion was applied June 21st, 1-12; July 1st 1-10; July 15th 1-11. The trees treated with the crude petroleum lost their leaves, while those tested with kerosene retained them. Approximately all the exposed young were killed by both emulsions at each application.

1916-17. Macfie, J.W.Scott.

1062 The limitations of kerosene as a larvicide, with some observations on the cutaneous respiration of mosquito larvae. Bull Ent. Res. vol. 7, pt. 3, pp. 277-295.

Oiling is the favorite method of ridding mosquito larvae from pools.

Ross, in 1899, first elaborated the method in Sierra Leone. There are many difficulties in applying this method. Some localities are not suited to oiling. The methods of applying kerosene are numerous. In each locality the best method and the amount of oil must be determined by experiment. Weeds interfere with the action of the oil probably by breaking the film. Organic matter in the water diminishes the action of kerosene possibly because the larvae tend to lie quietly on the debris at the bottom, in which condition O_2 absorption is low. If they remain there long enough they escape the pronounced action of the kerosene and on coming to the surface encounter only a thin film of oil. Petroleum oil may act (1) by annulling the surface tension of the water (2), by depriving the larvae of access to air and (3) by a toxic action on the larvae. Mcf. does not find the first cause to be operative. Larvae are able to adhere to the surface in spite of the presence of oil. The action of kerosene is independent of its solubility in water; dissolved toxic ingredients do not kill the larvae. If the air above the water in a confined space is charged with kerosene vapors, larvae of Stegomyia fasciata and Culex fatigans are killed. In actual practice the vapor of kerosene is rapidly ~~xistiilxx~~ distributed by air currents and a sufficient concentration to kill larvae is probably not maintained for any length of time. Larvae of C. fatigans, confined in distilled water under a layer of melted paraffin so that they could not come in contact with it, lived 3, 3-1/2 and 6 hours respectively; under kerosene, 3-1/2, 6-1/2 and 7-1/2 hrs. resp. In natural water they lived 65, 70 and 80 minutes under paraffin, and 65 and 70 minutes under kerosene. The organic matter in the water is thought to remove the O_2. The paraffin or kerosene did not give off soluble toxic substances. It is probable that kerosene exerts its effect by entering the siphon and being drawn into the body. A film of kerosene does not always kill larvae of S. fasciata because they can live ~~xxxxx~~ completely submerged. Species differ in their ability to withstand submergence and therefore to withstand a film of oil.

1924. Melander, A. L.

1166 The preparation of oil sprays.

Proc. Wash. State Hort. Assn. 1924, pp. 89-93.

A good oil spray should be effective, safe, cheap and easily miscible, stable and not irritating. Oil sprays are of two types, miscible oils and emulsion stocks. A miscible oil is an oil solution of a soap emulsifier, with little or no water present. An emulsion stock is a concentrated emulsion, containing oil, emulsifier and water. Miscible oils require care in diluting. Emulsion stocks mix easily with water in any proportion. Many different oils were tested for killing value, and it was found that the group of oils known in the trade as the Neutral lubricating oils possessed the highest efficiency for dormant spraying. These are relatively light oils, not highly refined and inexpensive. The Red Engine oils came next in efficiency, but oils heavier than the Red Engine oils were not so good, apparently lacking penetration. For spray purposes oil is always applied in the form of an emulsion which means a mixture of minute droplets of oil suspended in water, the droplets being kept from coalescing by the presence of the substance called the emulsifier. The smaller the droplets of oil the whiter and more lasting is the emulsion and apparently the more effective it is. A yellowish emulsion has relatively coarse droplets of oil and is liable to separate the oil on standing a few moments. The following formula has given better results than any other spray used. It is slightly more expensive than some of the other cold mixes, although it is cheaper than the government formula for boiled Red Engine oil spray:

Neutral type of lubricating oil,	91 parts by volume,
Potash whale oil soap, containing 30% moisture,	5 parts,
Crude cresytic acid,	4 parts.

The soft soap and the cresylic acid are first stirred together; when they become liquid and comprise the emulsifier, which is called Cresoap. This liquid Cresoap is stirred in the oil and the miscible oil is made and ready to use.

Gluemulsion is made by the following formula:

Lubricating oil,	4 gals.,
Water,	2 gals,,
Glue,	2 oz.

The glue is dissolved by soaking over night. The emulsion stock is made by pumping into a uniform, creamy stock.

The following ingredients are pumped together to make the Egg-Oil Emulsion: Lubricating oil, 4 gals., Water, 1-1/2 gals., Egg 1, large or medium sized.

The following formula for Caseinate oil emulsion is given: Lubricating oil, 4 gals., Water 2 gals., Calcium Caseinate spreader powder, 2 ozs. The powder is dissolved in the water and then the ingredients are pumped together until creamy. More details may be gotten from Wash.Agr.Expt.Station Gen.Bul.184.

1924 - Melander, A. L., Spuler A, & Green, E.L.

1168 Oil sprays; their preparation and use for insect control.

Wash. Agric. Expt.Sta. Gen. Bul. 184; 31 pp.

The uses of oil sprays and dissatisfactions with oil sprays are discussed. Oil sprays are classified as follows with a discussion of each: Lubricating oil sprays; used crank case oil and proprietary oils. Soaps, cresol and fish oil are discussed as emulsifiers. Nine formulas for oil emulsions are given with directions for preparations. (1) WSC Miscible oil; lubricating oil 90% by wt. or 91% by volume; cresoap 10% by wt. or 9% by volume (2) Cresoap emulsion stock; lubricating oil, 64 parts, water 30 parts, cresoap 6 parts. (3) boiled emulsion (Gov. formula); lubricating oil, 2 gals. potash fish oil soap 2 lbs. water 1 gal. (4) Gluemulsion; lubricating oil 75 parts; water 25 parts; glue 3/8 part. (5) egg-oil emulsion; lubricating oil 4 gals. water 1½ gals; egg 1 large or medium sized. (6) simplified caseinate oil emulsion; lubricating oil 75 parts (by wt.) water 25 parts, calcium caseinate spreader powder, 3/8 parts. (7) Bordeaux-oil; lubricating oil 4 gals., water 1 gal, milk of lime 1/2 gal. copper sulphate (Bluestone) solution 1/2 gal. (8). Kerosene emulsion (with cresoap); kerosene 67 parts (by wt.) water 33 parts cresoap ½ part. (9) kerosene emulsion (with caseinate); kerosene 67 parts (by wt.) water 33 parts; caseinate spreader ½ part. Precautions in making oil sprays are given with discussions on reversed emulsions, broken emulsions and a trouble chart for oil sprays. The costs, time of application and strength of sprays are discussed.

1890. [illegible], A. [illegible] D.S.

1173 Some new [illegible] and their [illegible].

[illegible]as Agr. Expt. Sta. Bull. No. 15, Dec. 10 pp.

K[illegible] soap, commonly known as Sluige, is made from a refuse in th[illegible] of [illegible] oil. It is a [illegible] insecticide, [illegible] tree [illegible] and some other insects. It proved a failure on the cotton worm. [illegible] extract of Pyrethrum proved a powerful insecticide. $2\frac{1}{4}$ lbs of [illegible] is used to about $1\frac{1}{2}$ gallons of kerosene. The yellowish oily ex-[illegible] was emulsified by dissolving 1 lb of soap in 1 gallon of boiling [illegible]. To this was added one gallon of the extract. It is mixed by means [illegible] force pump so thoroughly that the oil will not separate on standing. [illegible] with one part emulsion to 450 or 500 parts of water. Applications [illegible] in the powder form combined with ashes, cotton seed meal, refuse py-[illegible] powder and flour were hardly satisfactory.

1911 Metcalf, Z.P.

1178 Test Spraying for the Gloomy Scale (Chrysomphalus tenebricosus Comst.)

Jour. Econ. Ent., 4, No. 6, pp. 515-521.

Formula. Kerosene emulsion, 15, 20, 25 o/o killed practically no scales; 30 o/o poor results; 40, 50 and 60 o/o oil gave fair results. At 60 o/o oil concentration the tree was killed. Pure kerosene gave poor results on the scale and killed the tree. Carbolic kerosene emulsion (1 lb. soap) 30 gal. water, 3 gal. kerosene, 3 gal. crude carbolic acid, emulsified as usual) gave poor results. Any of the soluble oils at 1 to 8 or 1 to 10 are satisfactory. Scalecide, Orchard brand soluble oil, Scalecoil, Target brand Scale destroyer, Spray-on, One-for-all, [illegible]'s insect emulsion, Scale clean, San-U-Zay and others used. The oils probably owe their superior killing powers to the fact they remain moist longer than lime-sulfur and are thus able to creep in between the dorsal and ventral scales.

1918. Moore, William.

1191 Jour. Econ. Ent. 11, p. 443.

Larvae of the wax moth (Galleria mellonella) were injected with a saturated solution of Methylene blue and then dipped in a light lubricating oil. Control larvae (injected with methylene blue but not dipped in oil) remained blue while those dipped in the oil quickly faded. When the treated larvae were opened with scissors, the tissues and body fluids immediately turned blue. When some of the body fluid was removed with a capillary tube and exposed to the air, it assumed a blue color in a few mins. Olive oil had the same effect as the lubricating oil ~~injected.~~ An injected Larva was covered with a heavy lubricating oil (so viscous that it was unable to penetrate tracheae) It moved about for four hours, retaining its blue color. It was then placed under a thicker layer of the oil after which it lost the blue color and was stupefied within one hour. When the oil was removed from its body, it again assumed the blue color but did not survive the treatment. One injected larva was dipped in light lubricating oil so as to fill the tracheae of the cephalic portion; another dipped to fill tracheae of caudad end. Larvae did not lose the blue color; Then they were placed in water until stupefied. The larvae were now colorless. On removal to air and drying, that portion of body dipped in oil remained colorless while the other part became bright blue. Later both larvae became entirely blue. Conclusion: A contact insecticide containing oil or soap may penetrate the tracheae preventing normal oxidations. The insects die from their mechanical actions alone. To insure death all the [illegible] must be filled with the spray. Nicotine may produce death by chemical action without materially influencing the intake of oxygen. For small insects, such as aphids, an insecticide which kills by mechanical action gives good results [illegible] all or nearly all the tracheae will be filled. For larger insects this is more difficult and an insecticide which kills chemically must be used. S[illegible] insects, such as the clothes louse (Pediculus corporis) are [illegible] tracheae quickly enough to keep out soap solutions, lubricating [illegible], etc.

1918. Moore and Graham. - J. Econ. Ent. 11, p. 70.

1193 A Studies of the toxicity of kerosene.

Marcovitch in 1916 sprayed a field of potatoes with pure kerosene killing leaf hoppers(Jassidae) without injuring the plants. Burning of foliage has generally been attributed to imperfect emulsification. Kerosene usually consists of fractions of petroleum oil distilling between 150°- 300°C. It may vary considerably in composition due to method of preparation. Some samples are marketed directed after distillation; others are further purified. Some consist of heavy oils diluted with naptha to give the proper flash point; others are produced from heavy oils by cracking. Chemical composition varies somewhat depending upon the source (i.e whether of paraffin or asphaltic base and in more minor details). Moore obtained 5 samples of American kerosene, 2 from the same oil field but different oils, 3 from different oil fields. Each oil was distilled into four fractions, with extreme limits, as follows: 135°- 200°; 183-240°; 231-285° and 260-280°C. These fractions were emulsified with ivory soap and sprayed on tomato plants in the greenhouse. The results showed that different brands of kerosene differ in toxicity to plants and fractions from the same brand also differ. Generally the lowest fraction injures the plant less than the 2nd fraction, but the 2nd fraction injures more than the 3d fraction. The first fraction penetrates the leaves very quickly and produces injury quicker than the higher fractions. The soap of the emulsion protected the plants from the most volatile fractions till they had evaporated, hence they were less injurious than the higher fractions which remained on the plant longer after the emulsion had dried out. Some kerosene at high concentrations(25 o/o oil) are not injurious to plants while others are injurious at 3 o/o oil strength, possibly due to impurities in certain oils. Diluting ~~with~~ emulsions with hard water produced greater injury to tomato plants than diluting with distilled water. In the vapor phase, only the first and second fractions were toxic to house flies in 400 minutes. The 3rd fraction did not kill in this time. Apparently death was due only to the portions of the 2nd fraction which had the lowest b. P. Results of Spraying Aphis viburnicola Gillette with a 5 o/o emulsion (Aphids killed):

Oil	un-fractionalid	1st fraction	2nd fraction	3rd fraction
A	81.5 o/o	56.5	94	90
B	74	66.7	100	100
C	90	66.7	77	100
D	90	90	76	96
E	80	60	89	100

The soap in a 5 o/o emulsion killed 30 o/o of the aphids.

M. recommends that kerosenes for insecticides be manufactured to meet an insecticide test rather than a flash test.

1921 Moznette, G.F.

1212 Jr. Econ. Ent. 14, no. 6, pp. 469-472

Control of two scale insects of the mango.

Commercial miscible oils (2 sprays 1-70 and 1-80) give about 80 o/o kill. They vary in composition and may contain ingredients which cause foliage injury. They do not seem to spread as readily as the oil emulsion described herein. Paraffin oil emulsion (2 sprays 1-70 and 1-80) kill 90-95 o/o of scales. Deep well waters of Florida are in limestone formation and are termed hard; surface waters are usually somewhat brackish.

4-5 lbs K-fish oil soap per 125 gals. and used as a water softener. Stabilizers also used in the emulsions.

1924. Newcomer, E. J.

1220 Summer oil sprays.

Proc. Wash. State Hort. Assn., 1924, p. 93-7.

There are various kinds of oil sprays available for summer use. Those made of lubricating oils are much safer than those containing fuel oils. The best oil sprays to use are the lubricating oil emulsions made up with fish oil soap, or with casein or some other organic emulsifier. Miscible oils are not recommended for summer use. The cresol used in them as an emulsifier is very prone to injure the foliage and their use in the summer is not safe. The pests that may be controlled with oil sprays are mostly those which obtain their food by means of a sucking beak. Among these pests, the most important are the red spiders, aphids, scale, and the leaf and tree hoppers. Results of tests with various sprays, as Lime sulphur, wettable sulphur, nicotine sulphate, fish oil soap and oil emulsions, against the red spider showed that the oil sprays are the most effective. Tests made with the green apple aphid showed that a 1 % oil spray was necessary to give a complete kill. Summer spraying with oil on San Jose scale is not advised. The amount of oil necessary to be effective is about 2%, which is too strong for summer use. Oil sprays were tested for the control of the codling moth, but are not recommended. In order to avoid injury to the fruit or foliage, there should be no free oil in the spray and spraying when the temperature is above 90°F. should be avoided.

1926. Pecheux, H.

1259 Recherches sur la constante dielectrique des petroles et paraffines.

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Comptes Rendus de l'Academie des Sciences. T. 183, No.13, 27 Sept.1926, pp.530-532.

Nature of Material	Density at t°		Fusion Point	Boiling Point at H mm.		Dielectric Constant K	Constant Ko(at 0°)*	Coefficient a
Gasolene	0.655 at	18°C	"	56°	758 mm	1.724 18°	"	"
Kerosene	0.703)	18.5°	"	98	"	1.873) 18.5°	"	"
Crude kerosene	0.806)		"	207	"	2.027)	"	"
Heavy oil	0.879)	20°	"	249	"	2.127) 20°	2.181	- 0,001,238
Vaseline oil	0.849)		"	314.5	"	2.091)	2.140	- 0,001,152
Paraffin oil	0.855)		"	330	"	2.103)	2.158	- 0,001, 274
Paraffin A (Liquid)	0.856	19°	51°	364.5	757	2.145 19°	2.170	- 0.000,614
Paraffin B (Hard)	0.886)	17.5°	54°	383.5	"	2.036) 17.5°	2.056	- 0,000,565
Paraffin C (Hard)	0.900)		59°	394.5	"	2.054)	2.067	- 0,000,370

* Ko = K at 0°.

(1) For the liquid petroleums, the dielectric constant increases with the density; the coefficient a (negative) increases, in absolute value, with the dielectric constant.

(2) For the hard paraffins, K increases likewise with the density; but a decreases, in absolute value, as K increases.

(3) The liquid paraffin A which gives a more homogeneous product on solidification furnishes a higher dielectric power and thus approaches the paraffin oil of which it has nearly the same density.

(4) The coefficient of temperature, negative for all the petrols and paraffins, shows an absolute value 2 to 3 times, weaker for the paraffins than for the liquid petrols.

1908 - Parrott, P. J.

1273 Remedies for the San Jose scale and directions for their use.

N.Y. State Agric. Expt. Sta. Circular 9; pp. 388- 397.

Homemade oil emulsion is made by dissolving ½ lb. whale oil or fish oil soap in 1 gal. of boiling water. After removing the vessel from the fire add 2 gals. of crude petroleum or kerosene. This mixture is agitated from three to five minutes by pumping into itself. Crude petroleum is preferred to kerosene for spraying dormant trees in the spring. Dilute the above formula with 7 gallons of water making a 20% crude oil spray for spring treatment of apples and pears, before the buds burst. For treatment of trees in full leaf, dilute the above formula with 17 gals. of water, making a 10% oil spray. To make a kerosene - Bordeaux mixture for summer use, pour 4 gals. kerosene in a tub and add 8 lbs. wheat flour. Thoroly stir the oil and flour by means of a paddle. Then pour in Bordeaux mixture in small quantities until the spray can be pumped thru' a nozzle. Then add Bordeaux to make 40 gals. of mixture and pump until flour is free of lumps, and is evenly distributed. This mixture will contain 10% oil. The flour acts as a carrier of the oil and adds to the body of the Bordeaux mixture which permits a heavy coating of the trees. It should prove of value for pests like the scale, pear psylla and plant lice. A number of miscible oils are listed. They should never be applied while the trees are in leaf or when the buds are opening as they may cause severe injury. Homemade miscible oils are mentioned but are not recommended. For their preparation reference is made to bulletins 75 and 79, Delaware Expt. Sta. and Bul. 49 Storrs Expt. Sta. Conn.

1925. Parrott, P.J. and Glasgow, Hugh.

1281 The efficiency of various sprays and dust mixtures in controlling the rosy aphis. Jour. Ec. Ent. vol. 18, no. 1. pp. 214-218.

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Red Engine Oil emulsion (3 gal. emulsion to 97 Gal. H20. i.e. 2 o/o oil) was applied to apple trees infested with rosy aphis at delayed dormant and pink stage. Results:

Treatment.	No. trees counted	Fruits per tree Avg.	Aphis per tree	Apples Avg.	Apples injured. by Aphis o/o
Delayed dormant	10	[illegible]4		45	6.6
Pink	7	[illegible]7	13	42	[illegible]3.3
Control	5	1967	1076		54.7

[illegible]:

Lubricating oil emulsion gave good commercial control but was inferior to lime-sulfur-nicotine sulfate, wettable S+nicotine sulphate sprays but the difference in efficiency was not great. Because of low cost it appears to have a distinct field of usefulness especially where San Jose Scale treatment is combined with aphis treatment and plant diseases or other insects are [illegible] present.

[illegible] ion did not give quite as good control as lubricating

1906 - Penny, C. L.

1905

Petroleum Emulsions.
Dela. Coll. Agr. Expt. Station Bul. 75, pp. 39.

In this bulletin methods of making petroleum emulsions are described without guaranty of their efficiency as insecticides. These emulsions depend on soap for their existance, and sometimes on other auxilliary agents. Different formulas call for different proportions of emulifier and are accordingly differently adapted to summer and winter applications. "Soluble Oils" sometimes require a preliminary "Manipulation" with a little water before they will emulsify. It is cheaper to prepare the emulsifier, or "Concentrated Oil", alone and to add the necessary amount of petroleum oils at the place where the material is to be used. High rated "soluble oils" are usually turbid, separate into two parts and need to be mixed before using. Probably a very small fraction of the oil emulsified is visible when magnified. Some emulsions separate within a short time, others last for months. Most of the various insecticides except Paris green, decompose soap and therefore destroy the emulsions with which they are mixed. Hence there is urgent need of clean vessels and utensils. Kaolin or even good clay may be used as a "marker" to indicate the completeness of the spraying. Crude oil emulsions are somewhat more difficult to make than those with kerosene, but they are entirely practicable. The cost of materials needed to emulsify a gallon of kerosene or of petroleum oils ranges from one ~~to~~ and one-half to fifteen cents. "Soluble oils" may easily be made, with but a few appliances and with but little skill.

See original article for further details and formulas.

1921
1909 Penny, Donald D. - Jr. Econ. Ent. v. 14, p. 428 (1921)
The results of using certain oil sprays for the control of the fruit tree leaf roller in the Pajaro Valley, California.

Oil spraying for eggs of the leaf roller has given unsatisfactory results probably because the proper type of oil has not been used. Kerosene emulsion and miscible oils have given practically no control. Results of authors experiments:

Oil emulsion.	o/o Oil	Total Eggs	o/o eggs killed by dipping	o/o of eggs killed in sprayed plots
Western Crude Oil (Ortho)	5	51	43.1	
"	10	45	68.8	
"	15	45	97.7	
Check	_	52	1.9	
Western Crude Oil (Ortho)	12	60		50
Penn. Crude Oil 42°Be	5	47	95.7	
"	10	46	100.	
"	15	48	100	
"	12	27		37
Western Crude Oil 24°Be	5	52	50.	
"	10	43	88.3	
"	15	43	97.6	
Check	—	44	13.6	
Penn. Crude Oil 42°Be	5	51	66.6	
"	10	40	100	
"	15	48	100	
"	10	52		26.9
Western Shell distillate 38°Be	5	51	13.7	
"	10	47	19.1	
"	15	49	12.2	
"	10	57		1.7
Penn. Gas Oil [illegible] Be	5	44	93.1	
	10	44	100	
	15	51	100	
	10	63		80.9

Calol Diesel Oil 24°Be (Calif.Oil)	o/o Oil	Total eggs	o/o eggs killed by dipping	o/o of eggs killed in sprayed plots
	5	46	52.1	
	10	53	94.3	
"	15	52	100.	
"	1[illegible]	67		
"				28.3
Spa-mulsion				
Commercial	1-10	44	56.8	
"	Max. strength	50	12	
Miscible Oil No.1 (Balfour Guthrie Co.)	Recommended strength	57		7.

(*) With 5 o/o cresol soap (Cresolic acid, 5 lbs. fatty acid 5 lbs N_aOH 1. 7 lbs.)

Oil sprays produce marked tree stimulation.

Penn. Gas oil gave best results. Penn Oil generally better than Western.

1925. Pettit, R. H.

1320 Report of the section of entomology.

Mich. Agr. Expt. Sta. Rept. 1924, pp. 209-219.

This is a brief report of the occurrence of, and work of the year with, several of the more important insect pests.

In control work with Leucotermes flavipes, which is becoming more and more destructive to public buildings and dwellings in the North Central States, kerosene has given quite successful results. L. flavipes is destroyed by drilling holes and injecting kerosene into nests that can be found, and the fumes will also penetrate through its workings and kill many individuals at a distance. The addition of 1 or 2 oz. of pyrethrum to each gallon of kerosene increases the efficiency of the kerosene quite materially.

At Lansing, the fruit of plums was gnawed by Cryptorhyncus lapathi sufficiently to start rotting. In control work for the white-pine scale (Chionaspis pinifoliae), tests were made of scalecide at the rate of 1 to 25 and 1 to 20 of water and of Sunoco spray oil at the rate of 1 to 30 and 1 to 25 of water. Satisfactory results were obtained with 3,000 6-year-old pine trees and a number of large trees by thoroughly drenching them at a pressure of 250 lbs. A large proportion of the mature scales were found parasitized by a new species of Prospaltella.

1908 - Phillips, J. L.

1323

Home-made soluble oils for use against the San Jose scale.

Va. Agr. Expt. Sta. Bul. 179; pp. 77-88.

Three distinct processes are used in making home-made soluble oils; 1st: making the soap solution; 2nd: Adding the required amount of oils and water to make the soluble oil; 3rd: Diluting the soluble oil with water to make the emulsion ready for application. The soap solution is made as follows: Menhaden oil 5 gals; carbolic acid (liquid, crude, strawcolor, 100% pure) 4 gals; Caustic potash 7½ lbs. These are heated to 290-300°F and the following is added while still hot: Kerosene 7 gals; water 11 gals. These are stirred until a ropy soap mixture is formed that does not separate on standing.

The following formulas are given for using the soap solution:

#1. Soap solution - 9 gals.
Crude oil - 20 "
Rosin oil - 5 "
Water - 7½ "
Contains about 69-4/5 oil.

#2. Soap solution - 9 gals.
crude oil -20 "
Paraffin oil -10 "
Rosin oil - 6 "
Water - 6¼ "
Contains about 78% oil.

#3. Soap solution - 9 gals.
paraffin oil - 40 "
Rosin oil - 6 "
Water - 1¼ "
Contains about 88-9/10% oil.

The soluble oils should be used only in the dormant season.

Formula 1 is recommended for use at 1-9 strength; formula 2 at 1-10; strength and formula 3 at 1-12.

1898 - Powell, G. Harold.

1342 Report of the Entomologist. Kerosene Experiments pp. 239-246. In 10th Ann. Rept. Del. Coll. Agr. Expt. Sta. for 1898.

A plum tree, pear tree, apple tree and a peach tree were sprayed with commercial 150° fire test kerosene oil. The spraying was done in Sept. The apple and peach foliage was uninjured. The plum and peach foliage turned darker in color, and was glossy and oily in appearance until it dropped. Final observations were made next season. The peach tree was killed, the apple and pear uninjured, while the plum had all the fruit spurs and buds, the small branches and many of the larger branches killed. Experiments were made with various grades of oil. Five grades were obtained; (1) 150° fire, (2) Refined, water white, (3) 110° fire, distillate, unfinished (4) 110° fire, refined, standard white, (5) Pure distillate, 44 gravity. The difference between the distillate and refined oils, of the same fire test, is that the former is treated with sulphuric acid to break up and remove a number of offensive smelling products, chiefly carbon combined with sulphur. The objectionable products decomposed by the acid, and the carbon precipitated. The oil is then thoroly washed to remove the sulphuric acid, and is later treated with caustic soda to neutralize any acid that may have escaped the washing. The oil designated "Pure Distillate" is the product vaporized from the stills and condensed, and ~~which~~ has received no chemical treatment. It has a specific gravity of 44, and a low boiling point. Nine trees treated with 150° fire, distillate, had 30% of all the fruit, and the leaf spurs injured. The 12 trees, sprayed with 150° fire, refined water white oil, were in about the same condition as those treated with the distillate, unfinished oil. The 14 trees, treated with the 110° fire, distillate unfinished oil had 50% or more of the spurs killed outright, and many buds killed on spurs that were still alive. The injury to the 17 trees sprayed with the 110° fire, Refined standard white was apparently more severe than that in the preceding series. The most severe injury resulted, from the use of the "Pure Distillate" 44 gravity. Practically all of the fruit spurs on the 11 trees were killed, and many of the larger branches had thrown out no leaves. All of the oils reduced the scale to the minimum number, which at that time in no way menaced the health of the tree, or interfered with the appearance of the fruit. Treatint the oils with the sulphuric acid did not lessen the injury of the oils. The "Pure Distillate" cannot be used due to excessive injury. Results point to a greater injury with the oils of 110° fire. If the oil proves to be more injurious to trees in later tests, the question resolves itself into a physiological and a chemical problem. On the first phase of the question, no definite information is at hand, and on the latter phase, it can be said that the chief product found ~~largely~~ in the 110° oil, and which exists to a less extent in the 150° oil, is Heptane, which is a mobile liquid, possessing a slight, pleasant smell, boiling at 154°F, having at 62°F, a specific gravity 0.663, while that of its vapor is 2.98.

150° fire distillate unfinished

1922. Pratt, B. G.

1343 Nature and action of oil sprays.

Better Fruit, Vol.17, No.5, pp.10,11,19,20.

Miscible oils are not emulsions but a combination of oils so treated that when added to water they mix with the water and stay mixed without agitation. A greater or less amount of the preparation consists of pure soluble oil; the rest forms an emulsion. In an emulsion, the oil globule is broken up mechanically and will eventually settle out to pure oil. In a miscible oil the globule is broken up chemically to very much finer globules than it is possible to obtain in an emulsion. The globules will not settle out except by chemical action or freezing. It is possible to make a miscible oil containing 65-80 % soluble oil and 20 - 35% emulsion.

Kinds of miscible oils: (1) 1 part K-soap made from fish, animal or vegetable oil. Liquify the soap with 1 part carbolic acid or cresylic acid; add 17 parts petroleum oil about 1 part water to balance it and make it miscible in water. (2) Treat a vegetable oil with H_2SO_4 till it is perfectly soluble in water. Neutralize this with an alkali like NH_4OH. Combine this with 3-4 parts petroleum oil and about 1/2 part water and alkali to balance and render the mixture miscible in water.

Miscible oils made with vegetable oils are more expensive than the other kind but are worth the difference. There are also differences in the kind and gravity of oil used, whether asphaltum or paraffin base.

Miscible oils were first introduced in 1904 and were looked upon with suspicion because pure oil and emulsion sprays had been found to be dangerous to trees. Furthermore, the early miscible oils were not properly made.

A properly made miscible oil will mix with water in any proportion greater than itself. "When sprayed on a tree, a certain proportion penetrates the corky tissues of the bark into the sap cells and is further diluted in the soap, and in a short time is completely diffused or assimilated by the sap. If, however, the oil spray is not perfectly miscible or is an emulsion composed of large globules of oil, it will penetrate into the sap cells but not being soluble or miscible in the cell sap, it will interfere with the intercellular action of the sap and cause the lenticels to enlarge and possibly burst the cells-- the injury being in proportion to the amount and coarseness of the oil globule."

A miscible oil will not freeze unless mixed with water. When sprayed on a tree in freezing weather the oil will separate and injure the tree. Never spray below 40° F.

Gives an example of a peach orchard sprayed for 19 years with Scalecide without injury.

Miscible oils have a stimulating effect on trees. This depends upon the amount of vegetable oil they contain.

If kept for a long time in wooden barrels, miscible oils become more or less unstable.

They must be shaken or stirred thoroughly before using. They must contain a definite amount of water. If lost by evaporation, it must be replaced carefully and thoroughly stirred in.

The spray tank should be free of lime-sulfur and lead arsenate.

1923. Primm, James K. and Hartley, E.A.

1348 Results of an Oil Spray in treatment of Box leaf miner (Morarthropalpus buxi Labou.) Jr. Econ. Ent. vol. 16, no. 5, pp. 435-40

"Sun Miscible Oil" (1-20) with 1 pt. 40 o/o nicotine sulfate to 50 gals. of spray was effective after one or two applications. This oil is free from fats, 16-17°Be and 1200 viscosity at 70°F. At this concentration no injury except a slight spotting of the leaves, noticeable one or two days after treatment, was observed.

1923 - Regan, W.S.

1388 The Fruit-tree Leaf-roller in Bitter Root Valley. Montana Agric. Expt. Sta. Bul. 154; 56 pp.

Recommendations of miscible oils for the destruction of the leaf roller eggmasses are made without consideration of the resistance to penetration offered by the masses of eggs. Tests were made to determine the effectiveness of many miscible oils: Dormoil, Universal Dormant Soluble Oil, Scalecide, Spray-Mulsion and Corona miscible oil were used. The effectiveness is about in the order given. However, Dormoil and Universal Dormant Soluble oil proved sufficiently effective to warrant their use for this purpose. Dormoil has a consistency similar to that of a fairly heavy automobile oil. The composition of Dormoil is given by the manufacturers is: mineral oil (light, lubrication oil type, made from California crudes, asphaltic) ~~ab~~ 82%; Phenol (mostly cresylic acid) about 4%; Dry soap 3.4%; water 8 to 10%. In view of the comparatively high efficiency of this miscible oil, a statement of the manufacturers appears to have considerable significance - that "the effectiveness of the product depends upon the characteristics of the oil used and the materials incorporated with it as emulsifying agents."

Universal Dormant Soluble oil is quite similar in consistency to Dormoil and there appears to be little choice between the two brands. In some tests the Dormant soluble oil gave a slightly better kill than Dormoil. In other cases a poorer kill was obtained. The composition of Dormant Soluble Oil is given by the California State Department of Agriculture as follows: Oils (Asphaltum base) 86.37% soap 4.03%; Phenols 2.80%, Rosin, Test positive; ash 1.57%; water 6%. Scalecide appeared to be a slightly lighter product than Dormoil and Dormant Soluble Oil. The manufacturer states that in the preparation of Scalecide a special distillate is used, which carries "as much of the native sulphur as possible:" "An asphaltum base oil is preferred because there is little or no sulphur in the paraffin base oils". The composition of scalecide is: water 7%, Phenol none; dry soap none; mineral oils 70%; vegetable oils 20%; alkali 1%; naphthaline 2%. Spra-mulsion was a brownish product with the consistency of soft soap. The composition as given by the manufacturers follows, the oil being asphaltum base. Tar acids 6%; water 5%; soap 8%; 32° Be distillate 47%; heavy neutral oil 34%. Since the completion of the tests the manufacturers have eliminated the distillate and increased the heavy neutral oil to 81% for leafroller control. The Corona miscible oil was a blackish product with the consistency of thick soap. Its composition, given by the manufacturers is as follows: Emulsifier 15%; Paraffin oil 74%; the balance was Phenols, etc.

Riley, C.V.

1413 The kerosene emulsion: Its origin, nature and increasing usefulness. - Proc. Soc. Prom. Agr. Sci.. p. 83-98.

Kerosene emulsion is useful to combat insects on plants, in the soil, for locusts and grasshoppers and for insects on domestic animals. It is an outgrowth of Riley's work as Chief of U.S. Ent. Commission and Entomologist of Department of Agriculture.. His assistant, Dr. W.S. Barnard, first suggested the use of milk as an emulsifier, and Mr H.G. Hubbard obtained the best soap formula for scale insects. The merits of the Cook formula (Mich. Agr. Exp. Sta. Bull. 73, 1891) are discussed at length. The formula used by Cook is as follows:

> Dissolve in 2 qts. of water 1 qt. of soft soap or 1/4 lb of hard soap by heating to boiling. The add one pt. of kerosene and stir violently 3 - 5 mins. or pump.

In 1887 Cook recommended 1 qt. soft soap, 1 qt. water and 1 pt. kerosene churned together. In 1886 he advised: 1 qt. soft soap in 1 gallon of water heated to boiling, and then 1/2 gallon of kerosene added. Again, in 1886, he advised: 1 quart of kerosene, 2 qts. of soft soap and 16 parts of water, the kerosene being stirred into the hot soap solution; in 1885, he advised a strong hot soap suds to which one pint of kerosene is added per gallon of suds. In 1884 he refers to a milk emulsion but prefers mixing to stirring. In 1884 the following recommendation was made: 1 qt. of soft soap, 2 gallons of water heated to boiling and 1 pt. of kerosene stirred in. In 1883: 1 qt. of soft soap and 1 gal. of water boiled, then add one pint of crude carbolic acid of 1 pt. of kerosene(no mention of stirring). Again, in 1883: Make a solution of soft soap and while hot stir in the kerosene in the proportion of 1 to 8 or 10 of suds. In 1887: Use a weak solution of carbolic acid, strong suds (of whaleoil or common soap (soft)) and tobacco water. The addition of 1/2 tea cup of crude petroleum to 2 gallons of either of the above makes them more effective.. Also for animals, use a wash of one part kerosene and 10 parts of water. Thus down to 1890 Cooks hardly recommends the same formula twice. Kerosene soap formula as made by Hubbard, was perfected in 1882. (Cf. Div. Ent. Bull. 1, 1883, pp.17-18) The use of kerosene and milk was described by Riley in 1880(Cf. Scientific American Oct. 16, 1880) Between 1880-82 experiments were made with milk in various forms, with soap and other mucilaginous substances, but the soap and milk formulae were considered the cheapest and most satisfactory (See Report Entomologist 1881-2) The unstable emulsions recommended by Cook were used years before (Cf. Insect Life, vol. 3, p 183). Riley's milk formula is made best with sour milk. No heat is needed, or at most a slight warming in water. A dash of vinegar, (teaspoon per quart)or rennet facilitates emulsification when fresh milk is used. Fermentation sets in within one week but the insecticidal value of the emulsion is not affected. Soap suds will take up only a certain quantity of kerosene; the Hubbard formula is close to the exact proportions. In the Cook formula, which contains more soap solution and less oil, there is always a separation of emulsion and soap solution. There is a good reason for the use of this excess soap. Riley cannot explain why Cook failed with the Hubbard formula in Michigan. (A footnote says, (p. 90) that lime in the water was the cause). The temperature of the liquid and the nature of the soap used affect the kerosene soap emulsion. The quality of the kerosene has little to do with the result. Differences may be expected between K (soft) soaps and Na soaps. Experiments by C.L. Marlatt and A.B. Cordley are appended. They show that the Cook formula when used with milk is even even less satisfactory than with soap.. The experiments were made at the same time with the same apparatus and churned equal periods.

Dilutions were made at once after the emulsions were prepared. Babbitt and Ivory soap give soft soap solutions at the recommended dilution, which emulsify easily whether hot or cold. When these soaps are used cold in the Cook formula some separation of soap solution and emulsion takes place, but it is not as great as when used hot. This is not true of the Hubbard formula. When soaps which do not solidify or gelatinized, are used, e. g. whaleoil soaps, the Cook formula preparation separates at once while the Hubbard formulae preps. do not. Cold soap solutions of this kind cannot be used in the Hubbard formula, but hot or cold solutions may be used in the Cook formula. A trace of free oil appears after a week or more in emulsions made by both formulas. The emulsions harden due to evaporation. The Hubbard emulsion dilutes better than the Cook emulsion. The fire test used by Cook is criticized adversely. Experiments are appended which show the superiority of the Hubbard formula.

1924 Robinson, R.H.

1441 The use of skim milk in the preparation of certain spray materials. Jour. Econ. Ent. vol. 17, No. 3, pp. 396-400.

Formula: Mineral oil 4 gals; water 1.5 gal; milk 1.5 qts; hydrated lime 2 oz. The milk and water are mixed, the lime being stirred in at this time. This mixture is poured into the oil and the whole is pumped thoroughly at 200 lbs. pressure or more. The lime neutralizes the acidity and dissolves the casein. NaOH or KOH may be used but lime is preferable if hard water is used in diluting. More lime may be required if the water is very hard. Whole milk or milk powder may be substituted for skim milk, the latter at 2.5 oz. for each qt. of milk. Any mineral or lubricating oil will do. Burroughs and Crube (1923) were unsuccessful with milk because they did not add an excess of lime. Under certain conditions a water-in-oil emulsion is formed instead of an oil-in-water emulsion. This may be diluted with water without destroying the emulsion.

The following substances improve the emulsifying powers of milk: Commercial cresylic acid, sheep dip, beechwood creosote and creosote oil. R. recommends the addition of 1 oz. commercial cresylic acid to the formule given above.

1908 Russell, H.M.

1455 Experiments for the control of the red spider in Florida.

Jour. Econ. Ent. vol I, pp. 377-80

Formula: Kerosene soap emulsion (1 part of stock solution to 10 parts water) was sprayed on wax ~~leaves~~ trees. 95 o/o kill was obtained with a few leaves burned but not seriously. The stock solution showed a small amount of free oil four weeks after making.

1[illegible] S[illegible]rs, J.J.

14[illegible]5 Miscible Oils and Emulsions. Jr. Econ Ent. vol 18, no. 2, pp. 287-292

"Red Engine Oils" vary greatly in visscosity, gravity, flash p, fire p., cold test, color and base. The term is therefore ambiguous. Many pale or yellow oils would serve as well for insecticide purposes. Color is largely due to refining methods and origin of the crude oil. Penn-Ohio crudes are generally paraffin base; West Coast asphaltic base, Oklahoma-Texas, variable combinations of both. The crude oil may vary from a light colored easy flowing liquid to a thick black liquid. S. critiases the terms "Diamond Paraffin" and Junior Red". Asphaltic base oils are more readily emulsified than paraffine base oils. Some paraffin base oils contain 12 o/o or more of paraffin. They may show a cold test as high as 85° while many range 35-60°. The cooling of a boiled emulsion under outdoor conditions interferes with uniform success in perparation. Viscosity of liquids is independent of sp. gr. hence the latter factor may be omitted from specifications. Insects'eggs may be more easily killed with a light oil which penetrates quickly than with a heavy oil. K-fish oil or whale oil soap vary greatly as to base, water content, and fatty acid content. Na soaps are more or less solid, K-soaps are soft while combinations of the two grades between, ~~the two~~. Hardness of water is also an important factor. Some samples of Red Engine oils are practically non-emulsifiable. In some localities commercial emulsions and miscible oils are more reliable than home-made emulsions.

1902. Scott, W. M. & Fiske, W. F.

14[illegible]8 Winter treatment of the San Jose scale in the light of recent experiments.

Ga. State Bd. Ent. Bul. 4, 32 p.

Peach trees 2 and 4 years old were used to test the comparative value of crude oil and kerosene; one versus two applications; Fall versus spring spraying; mechanical mixtures versus soap emulsions; the strength of oil required to be effective; the influence of weather; tests with Ohio crude oil and California Distillate. Oils used were Pennsylvania crude, 43° gravity; refined kerosene, 150° flash test; Ohio crude (fuel oil); California distillate. From the work kerosene and crude oil are equally good and equally safe to use on trees. The crude oil residuum may prove more destructive to the scale than the kerosene. It was supposed that two weak applications would have less injurious effect on the trees than one of great strength. The soap emulsion was the superior of the mechanical mixture in the destruction of the scale. The soap emulsion reduced the danger to the trees and enhanced the effect. The amount of oil to use depends entirely upon circumstances. The weather seemed to have little influence on these tests. Tests with the Ohio crude oil shows that the use of it for spraying purposes was attended with too much risk to make its use advisable. The California distillate is a product obtained by distilling oils with an asphalt base. It was used at strengths of 10%, 15%, and 20%; but with no better results than those obtained by use of ordinary oils.

Simmonetto, Moises
Revista de Agric., Comercio y Trabajo, Cuba Auo 5,No.2 Vol. 5, Apr. 1922,pp5-8

1524 INSECTICIDAL EMULSIONS and PHYSICO-CHEMICAL FACTORS

WHICH CONCUR IN THEIR EFFECTIVENESS.

The farmer is frequently called upon to use insecticidal and anti-cryptogamic solûtions in his daily combat with plant ennemies: Fungi and insects.

....

When an insecticidal liquid in general and an emulsion of a particular soap basis is to be used, various factors have to be taken into consideration, which have synchronically and scientifically an influence upon the good or bad result of the spray.

The principal factors may be enumerated as follows:

a) Homogeneousness of the emulsion.
b) Emulsifying coefficient.
c) Basic or acid reaction of the emulsion.
d) Wax film of the leaves
e) Waxy substances which the insects ~~segregate~~ secrete (particularly larvae) in connection with the tracheal orifices and respiratory organs.
f) the coefficient of adhesiveness.
g) the greater or lesser ~~splitting~~ subdivision ~~into~~ of the fat ~~or~~ and oleic globules.
h) The spraying ~~power~~ amount ~~and evenly fine distribution.~~ which influences the
i) the presence or absence of petroleum in the emulsion which has a distinct influence upon the dissolving properties of certain greases and oils, resulting in a more or less fine atomizing spray.
l). the quality of oil and fats used.
m) the quality and the properties of adhesive substances used.
n) the general atmospheric condition, which may be more or less adverse or favorable to a successful spraying.
o) the topography of the territory;in general the topographic aspect.
p) the time of the day in which the spray is done.
q) the varying consistency of the leaves.
r) the varying resisting power and nature of the insects.

a.) The effectiveness or ineffectiveness of the spray depends to a great extent upon the homogeneousness of the emulsion i.e. the even division of its composing substances. When the components are somewhat heterogenous or little soluble in water, they will remain on the bottom of the containers, in which the dilution has been made and there is consequently an uneven distribution of the active substances and no good result may be expected.

We shall have few fat globules and adhering particles on the surface and in the commencement of the operation the manipulation will appear as a mere simple wash, whereas in the later course a more concentrated solution will present a number of physical difficulties and physiological disturbences on the plants.

b.) In order increase the emulsifying coefficient and the effectiveness of the solution, a small quantity of petroleum is necessary, which favors materially the penetration of the greasy and ~~and~~ adhesive substances.

c.) The concentrated emulsion must not contain an excessive amount of potassium or sodium salts; on the other hand the manipulation is materially helped by the complete neutralisation of the fat acids (oleic-palmitic -or stearic) through the addition of salts; these may be in the form of hydrates or potassium or sodium carbonates.

A good emulsion should not contain an excessive amount of salts or acids.

d.) If the leaves segregate a waxy substance, which forms a kind of film of wax or varnish on the surface of the leaves the adhesiveness of the emulsions is very difficult.

To overcome partly this obstacle the presence of some solvent is necessary; in such case liquid petroleum renders a great assistance;

e.) When insects are in the larval stage they segregate a waxy substance of little known composition of white or sometimes of other colors. This wax protects the respiratory organs and the body of the insects from the effect of the emulsion, because the oily substances cannot act quick enough on this film.

f.) A very important factor in the effectiveness of oil emulsions is therfore their adhesiveness; this should however not be excessive, because it may stop the air-cells of the leaves and the leaves will die.

The adhesiveness of the emulsion must only be carried to the point, where the necessity to kill the insect, also allows a normal function of the leaves.

g.) A phenomenon, which I have studied and which sometimes caused grave inconveniences in the spraying quality, is caused by the tendency of the oil-globules to unite together, seperating thereby from the water. Larvae and eggs may survive unaffected on small places of the leaves, which are not covered or hit by the liquid. This explains, why in many instances a number of larvae appear after plants have been sprayed.

h.) Of great influence in the perfect distribution of the fatty and oily particles is also the regulating adjustment of the spraying machine. The more perfect the spray is, the more effective is its result. The spray when it leaves the nozzle of the apparatus, should come out as a fine foggy cloud and should settle on the plants like thaw. On the other hand if the stream of the spraying solution is directed too straight on the plants with some force, only a small portion of the spray will adhere.

i.) The presence or absence of petroleum in the emulsion has a great influence upon the homogeneousness of the spraying liquid and its adhesive power and its effectiveness upon the waxy film, which the insects segregate.

l.) the quality of soaps and consequently also that of the oils and fats used has a great influence upon the homogeneousness of the emulsion. According to the oil, that is used, we may have a greater or lesser fine subdivision of the globules. It is quite clear that the tendency of the g globules to unite is in direct ratio to the size of the globules. The larger the globules the greater and easier the tendency to unite and vice versa.

Soaps of a castor oil basis have for example the tendency and property to penetrate into and harmonize with the water particles to a greatter extent and therefore divide up the oil globules to better advantage.

m.) Many times adhesive substances are used, which by adding them to the emulsion, break up the latter; the object of the spray is rendered inadequate; it will no doubt kill the insects, but also on the other hand the leaves, obstructing the functions of photosynthesis and transpiration of the leaves.

No remedy should be applied, which damages the plants to a greater extent than the insect pest does. Two points must be taken in view there fore. One is to allow a perfect functipn of the very delicate organs of the plants another is to eliminate the insects.

Any varnishing substance has to be eliminated as very dangerous. One should conform to a material, which, while it has adhesive property will be sufficiently effective when sprayed on the leaves.

Emulsions in themselves have adhesive properties to a certain extent, which may be increased if a limited quantity of petroleum is added.

The problem is not as easy, as it may appear at the first l glancq, because we have to take into consideration, that active substances have to exercise their activity respectively their effectiveness on the smallest imaginable space; as an example may be mentioned the eggs of Aleurocanthus Woglumi; in this connection the adhesiveness is in an inverse relationship with the splitting up of the oil globules. Part of the health of the plants has necessarily to be sacrified, in order to liberate them from the parasitic ennemies. It is our object to prevent that the damage which we cause to the plant, be greater than that caused by the parasites.

One has not yet been successful in making an ideal emulsion, although appreciable efforts have been made in investigations in this line. The result depends entirely on further investigations and trials especially on a scientific basis, with the aid of a microscope in the chemical and entomological Laboratory.

No effort and energy is better employed than that which will lead to the discovery of a liquid, which reunites all the required qualities and ~~px~~ averts the damages, which injurious insects afflict to the agriculture. These damages expressed in figures reach millions of Dollars.

n.) The atmospheric conditions also have an influence upon the treatment of insect pests by means of emulsions. The fluctuations in weather conditions reflect directly on the increase or decrease of insect life in general. In a like manner the control of insect pests is restricted or favored accordingly. It is quite useless to spray after a heavy rain in a strong wind or during very doubtful weather.

o.) Good result also depends upon the study of the topographic conditions of the section of the country in question.

We must concentrate our main effort upon the center of infestation. in other words, work from the periphery towards the center. It is advisable to increase if possible the energetic measures of control in sections which are open to heavy winds, in protected localities, in warm and moist sections, which latter are generally the breeding places where the survival of the pest has the best chances.

p.) We won't have the same result however if we only spray one hour a day and do it in one place better than in another. It is not advisable to pour a cold spray on plants which have been heated in the hot sun. Attention is also called to the fact that insect unfold a greater activity during certain times of the day, more than they do at others.

q.) The varying structure of the leaves prevent us from using one solution to equal good advantage on different plants. The entomologist as well as the Medical man have to have special prescription for their patients the former for the plants, the latter for his sick clients. There is a limit of toleration and of repelling quality in either of them. The composition of the leaves has a certain resisting power to the toxic effect of insecticides and the same leaf again is differently affected by the same insecticide at different times of the season.

Emulsiones insecticidas y factores fisico-quimicos que concurren a su eficacia. Moises Simonetto Revista de Agric., Comercio y Trabajo, Cuba Año 5, No 2 vol. 5 Apr. 1922 p. 5-8

1902 - Smith, J. B.
1611

The Entomologist's Experiment Orchard.
N. J. Agric. Expt. Stat. Bull. 155; 71 pp.

Fifty fruit trees of all kinds were planted so that various insecticides could be tried on them and results noted. Results of oil sprays are given below: Fuel oil, Sp. gr. 35° killed peach; was safely used on plum in February, on Kieffer pear and on Crataegus in Dec., on Lawrence pear in winter; it killed Early Richmond Cherry. The material was sufficiently effective as an insecticide, but is not recommended. Kerosene in a 15% mechanical mixture was applied on apple in June and on pear at the same time, in each case with advantage. a 20% mixture was applied to apple, pear and plum in June. A 25% mixture was applied on apple in June. All these June applications were intended to kill larval scale and were about equally effective. Practically no injury resulted, except a slight scalding of foliage. Undiluted kerosene was applied on peach in August on apple in June and August. In each case the application was made with an atomizer, on a dry day and with good effect. In no case was any material injury caused. Crude petroleum was applied in a 10% mechanical mixture on Elberta peach in May, in a 20% mixture on Pride of Franklin peach in May, in a 40% mixture on Late Rose peach May 20th, defoliating and otherwise seriously injuring it; on Kieffer pear May 20th, causing no damage; and on Baldwin apple May 20th, also causing no harm. Undiluted crude oil was applied on Champion peach May 15th, defoliating it, but causing no further harm; on Fox's Seedling peach April 18th, just as blossoms were opening, killing most of them but doing no further harm. None of the summer treatments caused any real injury but required great care. No injury from any of the winter applications resulted. The best time to spray for scale is in the winter or dormant period when using crude oil either undiluted or in a mechanical mixture.

1902 -
Smith, J. B.
1614

Treatment for San Jose scale in orchard and nursery.
Penn. Dept. Agric. Bulletin 90, 33 pp.

The results obtained with kerosene have been excellent so far as effectiveness against scales is concerned. The effect of kerosene on trees has been extremely variable. Kerosene may be used either undiluted, in a mechanical mixture with water or in the form of an emulsion with soap. For winter application the emulsion has proved a failure. The R. & H formula and direction for making the emulsion are given. Kerosene depends for its effectiveness upon its penetrating power which carries it thru and under the scale, into contact with the insect below.

Crude petroleum is the natural product as it is obtained from the oil wells, and varies greatly in composition. The crude oil should have a specific gravity of 42°Be. or over. Crude oil contains the light naphthas, the somewhat heavier illuminating oils and, in addition, a variable quantity of paraffin and vaseline. The killing power is not only in the light oils, but in the vaseline residue; in fact, coating an infested bark with vaseline would result in the death of every covered scale, probably also in the death of the tree. Reference was made to the successful use of the 25% mechanical mixtures of oil.

1903 - Smith, J. B.
1616

Insecticides and their Uses.
N. J. Agric. Expt. Sta. Bul. 169; 27 p.

Petroleum and its derivatives are the most useful insecticides within their range; but require care and judgement lest the vegetation be injured as much as the insects. To be suited for use on plants without dilution crude petroleum should be entirely untreated and of a specific gravity of 43° or over. The light amber or green oils of Penn. and W. Va. answer every purpose. Rules for applying undiluted crude petroleum are:(1) The trees must be dry; (2) the oils slightly warm or at least not below 60°F., (3) Apply thru fine Vermorel nozzles, and just enough to wet without dripping; (4) Spray as late in the winter as possible; applications containing less than 25% crude oil are not advised for winter work; but mechanical mixtures of from 15 to 20% are excellent in middle or late Sept. to kill larvae and recent sets of the pernicious scale. Heavy oils are not recommended even in emulsions, and crude oil emulsions with soap have proved unsatisfactory. Kerosene may be safely used undiluted on almost any of the usual orchard trees, even when in full foliage, provided the application is made on a dry, sunny day; on a dry tree, and in a fine spray. The more usual application is in the form of a mechanical emulsion containing 25% or less of kerosene applied with a kerowater or other emulsion pump. Where no emulsion pump is available, the kerosene may be reduced by emulsifying with soap as follows: Dissolve ½ lb. hard soap in 1 gal. of boiling water; warm 2 gals. of kerosene and add to the boiling suds. Then churn with a force pump until a thick white cream is formed. This emulsion, diluted 1-12 or 15 is an excellent summer remedy for plant lice, the young leaf hoppers, mites, thrips, and other soft bodied insects that can be reached by contact poisons. The combination with soap makes the kerosene much more dangerous to plant life. The soap prevents the rapid evaporation of the kerosene and holds it to the bark until it penetrates. The mineral oils must be used with care.

1904 - Smith, J.B.
1620

Insecticide Experiments in 1904.

N. J. Agr. Expt. Sta. Bul. 178; 12 pp.

Crude petroleum was used by only a few growers during the season with excellent success and was the only material which was not a disappointment. A 25% mechanical mixture gave good results. Kilo-scale is a combination of heavy kerosene, sulphurated oil and resin, rendered soluble in water by a process known only to the manufacturers. This used at 1-20 caused little scalding of the foliage, killed all larvae, recent sets and breeding adults, leaving only some of the half-grown scales as possible survivors. Limoid is a finely-ground carefully hydrated pure magnesium lime, very light, without grit and smooth to touch. It absorbs and combines with kerosene into an even paste. Pour the kerosene into a barrel and for each gallon of oil stir in four lbs of limoid, keeping the mixture in continuous motion until it forms a sloppy mass. In case a little kerosene separates out sprinkle in a little more limoid to absorb it. To this add water in quantity equal to the kerosene, stir vigorously to get well mixed then add water to obtain the desired percentage and pump the mixture back into itself to form a thoro emulsion. This K-L reduced to contain 20 to 25% kerosene, has been used effectively against dormant scales in March and early April without injury to trees of any kind. It has been used at 10% kerosene as a summer wash, which killed all crawling young, a few old ones and a large proportion of intermediate sizes. Crude oil cannot be used with limoid. To the summer wash, containing 10% kerosene, 1 qt. of rosin soap in 25 Gals of mixture added greatly to its effectiveness. Rosin soap is made by dissolving 5 oz. of rosin in 1 quart of kerosene and 1 oz. of hard soap in 1 qt. of water. Combine the two mixtures and churn with a pump for 5 min., The kerosene and rosin, and soap and water solutions can be made up as stock and combined as needed.

1905 - Smith, J.B.
1621

Report of the Entomologist.

N. J. Agric. Expt. Stas. Ann. Rpt. 1904; pp.555-652.

Petroleum, crude or in the refined forms have maintained themselves as scale killers during the past season, though less oil is used because of the general rush to the lime-sulphur compounds as safer and equally effective. Mineral oils are dangerous to plant life. To obviate this trouble emulsions with soap and mechanical mixtures have been proposed and used with greater or less success. Kerosene emulsion with milk and soap is well known and has been widely and successfully used. Mechanical mixtures widened the use of oils but pumps to put them on successfully were not available, nor could they be made to work properly. When the question of dealing with mosquito larvae arose one investigator demanded an oil that would be soluble in water and would diffuse thru it, so as to reach larvae everywhere. In a short time several preparations, all of them purporting to be crude oil, rendered soluble in water were on the market. Kilo-scale was one of these. Several other samples were received, only one was tested for scale. All of them offer fair chances for success as against the scale insects without harm to the trees. The advantage of crude oil as a scale killer over all other insecticides is its penetrating power, combined with lasting qualities. Soluble oils have been used only as summer mixtures and as such have proved themselves. Whether they will act equally well at the same dilution against the dormant scales remains to be proved. Kill-o-Scale is a combination of heavy kerosene, sulphurated oil and resin, made soluble in water by a process known only to the manufacturers. This is a dormant spray only and can be used after the fruit is taken from the trees up until blossoming time in the spring. Applications were made in October diluting the material 1-20. There was no marked injury to the trees. Larvae and recent sets were killed at once, whenever the material reached them. Breeding adults were killed in most cases. This material exerted a continuous action for sometime, the resin perhaps holding it in contact with the insects and giving time to penetrate.

1906 - Smith, J. B.
1624

Report of the Entomologist.

N. J. Agr.Col. Expt.Sta. Ann. Rpt. 1905- pp. 527-687.

There are at present four distinct forms of soluble petroleum on the market. Textile oil may be included as a fifth. All these combinations mix readily with water, form a milky emulsion and spray and cover perfectly. The composition of Kill-o-scale, Scalecide, and Target Brand Scale Destroyer are known but nothing is known about Sure-Kill. No opportunity to test Sure-kill as to its reliability was obtained. The other oil preparations contain about 60% mineral oil. Textile oil is used for softening the fibers of certain fabrics and is said to be very poisonous. It is reported to be made up of 70% mineral oil (petroleum of some form) 20% animal oil, 10% alkali and water. This oil was tried on a plum 1-20, sprayed 4th of March. The tree was clean of scale in August. No appreciable injury to the fruit buds or the tree resulted. Textile oil carries more petroleum than Kill-o-Scale, forms a milky emulsion with water and sprays perfectly. Kill-o-scale gave some favorable and some unfavorable results. Diluted 1-20 it will kill the pernicious scale and at all periods of the year, though most certainly in the fall. The mixture must actually reach the scale. For a summer wash Kill-o-Scale is absolutely useless. Several different combinations of scalecide were used. Some of the materials were Texas crude, Pennsylvania crude, various distillates and refined kerosene. Scalecide as then used was based on a distillate combined with a sulphonated oil and a percentage of resin. On the whole, scalecide was not quite equal to that of Kill-o-scale, Kerosene limoid was used but with imperfect results. The combination should be theoretically, a very effective one. A 25% mixture used in late October or early November should give good results. Kerosene Naphthol was given a trial diluted 1-20. The formula showed 60% petroleum distillate, combined so as to be soluble in water. Only a partial effect was noted where this material was used. Some of it was tried on various kinds of foliage when scale breeding began, but the effect was so severe that it was necessary to abandon it altogether.

1907 - Smith, J. B.

1625 Report of the Entomologist.

N. J. Agr.Coll. Expt. Stas Rpt. 1906; pp. 515-609.

An interesting account of the manufacture of Scalecide is given. Results of the use of Scalecide sprayed on all kinds of orchard trees under all kinds of conditions by all sorts of men. To obtain good results the 1-20 dilution is too weak and a 1-15 dilution would be more effective. Two sprayings are advised, one in the fall and one in the spring. There need be no fear of injury from even the most thoro applic tion at 1-15 strength. Target Brand Scale Destroyer is a petroleum combination made by the American Horticultural Distributing Company, Martinsburg, W. Va. An account of a visit to this plant is given. The manufacturing of the material is explained, also the best methods of using the oil. This oil should be quite as effective as any of the soluble oils. Kilo-scale approaches Scalecide in com osition but has a considerable admixture of free sulphur. Its effectiveness was not fully determined. Scale-skiddo was tried in a small way. There was no injury to foliage and likewise to the scale. This was used in August. The Camden mixture appeared to be a resin and petroleum combination, which was unstable in character and separated on standing. A new sample was obtained which appeared more stable. This mixture was given a trial but not sufficient to make a satisfactory report as to its effectiveness. Diluted at 1-40 or 1-50, as advised, it proved ineffective. Mechanical mixtures of oil and water have been used and were very effective in all cases. Crude oil, in one form or another is still employed throughout the state, the insecticide oil of the Standard oil Company being the most used. The fruit growers who failed with lime-sulphur wash are using crude oil with success. Kerosene-limoid was not used extensively. K-L will kill scale when used liberally and will also kill trees when enough oil gets on them.

1908 - Smith, J.B.

1628 Insecticide Materials and their Applications: With suggestions for practice.

N. J. Agric. Expt. Stas. Bul. 213; 46 pp.

To be suited for use on plants without dilution, crude petroleum, should be entirely untreated and have a Sp. gr. of 43° Be of over at 60°F. The light amber or green oils of Pennsylvania and West Virginia answer every purpose. Rules to be observed in applying crude oil undiluted in winter, are (1) the trees must be dry (2) The oil at 60°F or above, as it sprays better, spreads better and penetrates better than when colder; (3) apply under good pressure thru fine Vermorel nozzles; (4) for greatest effect against the San Jose scale apply soon after the trees become dormant in the fall or just before they make a start in the spring. Mechanical mixtures of oil and water can be made but with some danger. A 25% mixture is as effective as the undiluted oil. A 15% mixture can be used in early summer to kill larvae and recent sets of oyster shell or other armored scales. Applications with less than 10% oil are useless at any time and emulsions with soap have proved unsatisfactory. Kerosene may be used undiluted on any of the usual orchard trees, even in full foliage, provided the application is made on a dry cool sunny day, on a dry tree and in a fine, forcible spray. Kerosene in a mechanical mixture with water is less effective than crude oil. The usual formula for emulsifying kerosene with soap is given. Making the emulsion was simplified by using Tak-a-Nap soap, a Naphtha soft soap that combines readily with kerosene, and forms a mixture that is more effective than when it is made with ordinary soap. Miscible Oils have been put on the market to replace the crude oil. Scalecide is a preparation of crude petroleum containing 70% mineral oil, with vegetable and resin oils and alkali to make up to 90%, leaving about 10% of water in the combination. Kilo-scale, a similar product was on the market before Scalecide. Target Brand emulsion is based on a paraffin oil. The oils mix readily with water. They are effective as winter washes for scale at 1-15. Miscible or soluble oil experiments were made at Delaware and Connecticut stations. Formulae are given which were taken from the bulletins of those stations.

[illegible]. Stedman, J.M.

1662 Some insect pests of the farm and garden.
Alabama Agr. Expt. Sta. Bull 45. pp. 36.

One half pound of hard soap dissolved in 1 gallon of boiling water; add two gall ns of kerosene. Violently churn to a creamy mass. Use one part emulsion to 9 parts cold water. Not injurious to foliage.

[illegible]. Stinson, J.T.

1670 Insects injurious to fruits and vegetables and remedies for destroying them.
Ark. Sta. Bull. 33. pp. 55-97

The destructiveness of kerosene is probably due to the rapidity with which it spreads over the insects and closes the breathing pores. Riley-Hubbard formula for kerosene emulsion and Professor [illegible]'s formula are given.

1920 - Sullivan, K. C.
1682

An Investigation of the dipping and fumigation of Nursery stock.

Mo. Agric. Expt. Sta. Bul. 177.

In a paper which appeared in Marseilles, France, in 1763, petroleum, turpentine and other oils were recommended for killing plant lice. In 1865 kerosene ~~and~~ was recommended in this country for destroying scale on orange trees and was successfully applied to oleander, sago palm, acacia and lemon trees. The oil was applied by means of a feather. In June 1866 kerosene was recommended, in Gardner's Monthly, for destroying all insect life. Later it was found that kerosene and other oils mixed better with water if soap was added. Kerosene ~~as~~ mixed with soap was first used in 1875. Since 1875 many different mixtures containing miscible oils have been recommended for the destruction of both chewing and sucking insects. Petroleum oils and soap form the basis of all miscible oils. The miscible oils kill by contact. The oils have great penetrating ability and probably kill the insect by preventing the assimulation of oxygen in the tissues. The following is the kerosene emulsion formula: Dissolve ½ lb. soap in 1 gal. hot water and add 2 gals. kerosene. The mixture is agitated for 5 to 60 minutes or until it becomes a creamy mass. Crude oil can be used for the kerosene. For a dormant ~~sp~~ spray dilute 1-4 or 5. A distillate emulsion is made by dissolving 20 lbs. whale oil soap in 12 gals. boiling water, adding 20 gal. distillate (26°Be), and agitating thoroly while the mixture is hot. For dormant use, dilute 1-20.

Experiments made with miscible oils show that they do not injure nursery stock to any great extent. A dilution of 1-12 caused a greater percent of injury than the 1-15 dilution. For San Jose scale the miscible oil gave excellent results. Both strengths, 1-12 and 1-15 controlled the scale on apple. Miscible oil injured the plants less and controlled the scale better than any of the other material used.

1910 - Symons, T. B. & Cory, E.N.
1702

The Terrapin Scale.

Md. Agric. Expt. Sta. Bull. 149; pp. 83-92.

Summary of Fall and Spring Spraying Tests.

Solution	Dilution	No. peach trees per application	Results of fall spraying	Results of double spray.	Results of spring spray.
Soluble oil	1-13	12 fall 12 double 9 spring	killed 90-95% scale and all fruit buds except 1 tree of an early variety	All scale killed; leaf buds O.K.	Practically all scale killed, all buds O.K.
Spray Oil	1-12	19 fall 19 double 5 spring	Killed 50% scale, buds O.K.	All scale killed;buds O.K.	35% scale killed; buds O.K.
Scalecide	1-10	17 fall 17 double 4 spring	90-95% scale killed; buds O.K.	Twigs & buds killed	45% scale killed; Buds O.K.
Soluble Oil-	1-20	500			Controlled scale; no bud damage.

Summer spraying was done in August with 10% kerosene emulsion. Some of the scale were killed, but it did not pay for the effort expended.

1910 - Symons, T.B., Peairs, L.M., & Cory, E.N.
1707

Spraying, Fumigating and Dipping for the Control of San Jose Scale.
Md. Agr.Expt.Sta. Bul. 148, pp. 47-81.

Orchard Brand Soluble Oil was used in fall and spring, on apple and peach at 1-15 with very good results. Scale Clean, a soluble oil, was tested on peaches at 1-15, with good results. Scale oil 1-15 on apples was moderately effective for fall spraying. Applied in the spring on peaches at 1-15, the results were satisfactory. Scalecide 1-15, the results were satisfactory. Scalecide 1-15 on peaches in the spring gave satisfactory results. Vacuum oil, a petroleum oil emulsion, sprayed on apples spring and fall at 1-15, gave comparatively good results. Sprayed on peaches in the spring 1-15, the results were not as favorable. San-U-Zay 1-15 on peaches did not give satisfactory results on account of difficulty in mixing it properly with water. Dipping experiments were made in fall and spring using kerosene, kerosene emulsion, Soluble Oil 1-15, and Scalecide 1-15. Results with kerosene; those dipped, tops only, started out from the base but many died later; Those completely dipped died, all scale killed. Kerosene emulsion: those trees dipped, tops only, grew very well but 18 of the 20 totally submerged were killed. No live scale. Orchard Brand soluble Oil: of these trees dipped tops only, 5 were killed to the base but grew out, while three of the trees totally submerged died. No scale present. Scalecide: effect on scale was excellent and growth good in most cases, except that bark of almost all was badly blistered. Spring tests: Kerosene was severely injurious in all cases. The injurious effect from kerosene emulsion was marked. Orchard Brand Soluble Oil: the growth in this case was slow but all finally grew well. All scale dead. Scalecide: Growth was satisfactory and there were no live scale.

1907 - Symons, T.B., & Weldon, G.P.

1708 Spraying for the San Jose Scale.

Maryland Agricultural Experiment Station Bul. 123, pp.139-152.

Two orchards were sprayed with proprietary oils one in the fall and the other in the late spring just as the trees were coming into bloom. Peach and apple trees were used in the experiment. Results are given below:

Insecticide used	Strength	No. trees sprayed	Injury	Results in killing scale.
Kilo-Scale	1-10	49	Slight	Good
"	1-15	38	"	"
"	1-20	37	None	Unsatisfactory
Target Brand	1-10	44	Severe	Good
"	1-15	34	Slight	"
"	1-20	35	Severe	Fair
Scalecide	1-10	57	None	Fair
"	1-15	40	"	"
"	1-20	27	"	"
Soluble petroleum	1-10	51	None	Very good
"	1-15	40	"	Good
"	1-20	34	"	Fair

When a serious infestation of scale is noticed in the summer, a 20% kerosene emulsion will check it until the dormant period. This spraying must be done on a sunny day. It is only a temporary relief. The following method is used in making the emulsion. Pour 10 gals. of kerosene in a 50 gallon spray barrel. Dissolve 1½ lbs. hard soap in 5 gals. of boiling water, and pour this into the kerosene. Emulsify by pumping the mixture into itself, for 15 minutes. Add 35 gals. of water and the mixture is ready to apply. If Tak-a-Nap soap is used the emulsion can be made as above, using 10 lbs. of the soap without heating the water.

1908 - Taylor, E. P.

1728 Scale Insects of the Orchards of Missouri.

Missouri State Fruit Expt.Sta. Bul. 18, pp. 7-87.

Oil Emulsions and Miscible Oil Sprays.

Pure kerosene and crude petroleum applied as a fine mist were tried as dormant sprays for San Jose scale, with the result that a high percentage of insects were destroyed, but the line between destruction of the insects and injury to the tree is too limited and uncertain. Kerosene and crude emulsions when properly made fulfilled the requirement of a complete and stable combination of oil and water. They are slightly more expensive than lime sulphur. The commercial insecticide manufacturers have produced concentrated oil mixtures known as miscible oils in which the oil has been chemically treated so as to make oil and water mix perfectly and permanently by simply pouring the miscible oil and cold water together and stirring for a moment. Some miscible oils on the market are: Scalecide, Kiloscale, Target Brand Scale Destroyer, Surekill, San-U-Zay Scale Oil. Work done by this station show miscible oils to have an average percent kill of scales of 99.6%, while lime sulphur shows a percent kill of 89.7%. However in some instances injury resulted to peach buds from the use of these oil sprays. The oils should not be used stronger than 1-20. Miscible oils are easily and rapidly prepared for use. Delaware Station Bulletins 75 and 79 and Penn. Sta. Bul. 86 give methods for prepairing miscible oils on the farm. The common kerosene emulsion is an oil emulsified by a soap. Kerosene being a lighter bodied oil, is more quickly evaporated than the heavier oils, such as crude petroleum. This makes it possible to use kerosene upon foliage in the summer at a higher percentage than miscible oils, that are made of the heavier petroleum oils. On the other hand the heavier oils are better for dormant spraying because they form a coating over the scales and plug the pores of the insect's body. The formula for making kerosene emulsion is: Dissolve ½ lb. hard soap in 1 gal. of boiling water; while still hot add to this 2 gals. of kerosene and briskly agitate for 5 minutes. The soap suds must be hot and the agitation must be very thorough to make a good emulsion.

1908 - Taylor, E. P.

1729 Homemade Oil Emulsion.

Missouri State Fruit Expt.Sta. Circ. 4, 3 p.

Formula for making an oil emulsion is: Soft water 1 gal., whale oil, laundry or fish oil soap ½ lb., Kerosene or crude oil 2 gals. To prepare, dissolve the soap in the water and heat to boiling. Then add the kerosene and briskly agitate for 5 minutes. The agitation may be done by pumping the mixture back into the containing vessel. For summer use, ~~make up with kerosene~~ diluting 1-9; this will give an emulsion containing 6.6% oil. For fall or spring, when tree is dormant crude petroleum may be used in place of kerosene. Dilute 1-6 which will give a 9½% oil emulsion. An oil emulsion which is not stable or which has free oil separated out should not be used. No home made emulsion formed with crude oil and containing more than 10% oil should be applied to fruit trees later than two weeks before the opening of the buds. Kerosene emulsion should not be applied to foliage of fruit trees stronger than 7%. Excessive amount of an oil emulsion of a low oil content is liable to be as injurious as is one of too high a percentage of oil, applied lightly. Frequent and continued use of oil sprays are supposed to possess an injurious cumulative effect upon the tree, which should be guarded against. Pure kerosene or crude petroleum or mechanical mixtures of either of them with water when not emulsified with soap are not [illegible]

1734
1909.. Theobald, Fred V.

Insect and other allied pests of orchard, bush and hothouse fruits and their prevention and treatment.

Wye XVI + 550 p.

Weak emulsions have some effect on the caterpillars of the Vapourer moth. For killing the larvae of the gout moth in the trees paraffin emulsion is squirted into the holes. If the tunnels are long and tortuous it is very doubtful if many are killed by it.

Constant spraying with paraffin emulsion in the spring will doubtless prevent egg laying of the apple leaf miner. Kerosene emulsion is of no value for the apple blossom weevil.

Apple aphids are most easily killed in the sexual stage in the autumn with a strong paraffin emulsion. 3% paraffin in the summer has proved beneficial for the [illegible] aphis. When employed in soft soap and quassia mixture, a weak paraffin emulsion may also be used. One of the best remedies for the mussel scale is paraffin emulsion.

The following formula was used with good results: 5 lbs. soft soap, 1 gal. paraffin (Tea Rose), 10 gals. water. One-half hour after the trees had been sprayed, the scales became dull grey. A few hours later scales were microscopically examined, and the eggs beneath were found to be shrivelled and dead, and all larvae that had hatched were at once killed. As the leaves close to the forks were seen to be scorched at once, the wash was reduced to the following proportions: 5 lbs. soft soap, 1 gal. paraffin, 40 gals. water. This was found to have the desired effect in not only killing the larvae and young scale, but also the ova beneath the scale. Two trees were sprayed with pure paraffin in the winter; in neither case was any damage done to the tree and all the scale was destroyed. The paraffin treatment should never be adopted in summer unless the attack is very severe.

The brown soft scale is best attacked by paraffin emulsion in late summer after the larvae have hatched.

The best wash for currant aphids is dilute paraffin emulsion. Paraffin emulsion made up with 6 gals. paraffin to 100 gals. of water is the best remedy for the brown currant scale. Hand-spraying with dilute emulsion when the leaves are off is the best treatment for fig scales. Paraffin jelly is the best material for use on the gooseberry red spider. Sponging or spraying with paraffin emulsion is best for the peach scale.

Paraffin emulsion for aphids on peach, apricot and nectarine can not be used as the delicate foliage can not stand the treatment. The mealy plum aphis is difficult to kill with paraffin emulsion. The addition of 1 lb. of liver of sulphur to 100 gals. of paraffin wash will easily kill this insect. The oyster shell bark louse is easily killed by a winter wash of paraffin emulsion. The nymphs of the yellow leaf hoppers are destroyed by washing with dilute paraffin emulsion, particularly when young. The following formula was very successful: Paraffin (White Rose), 3 gals.; soft soap 10 lbs; water 100 gals.

Paraffin emulsion is given as a treatment for the white scale on pineapple. The vine scale may be killed by painting or sponging with paraffin emulsion.

The following formula for Woburn [illegible] wash A is given: Iron sulphate 1/2 lb.; lime 1/4 lb.; caustic soda, 2 lbs.; paraffin (solar distillate) 5 pts.; water 10 gals. The wash kills the eggs of the mussel scale. The Woburn Winter Wash B

is as follows: Copper sulphate 1-1/2 lbs; lime 1/2 lb; paraffin (solar distillate) 5 pts.; caustic soda, 2 lbs; water, 10 gals. The mussel scale eggs are killed with this wash and also the oyster shell bark louse. The following paraffin emulsion formulas are given: For winter use only. (1) Paraffin (White rose) 1 gal; soft soap, 1-1/2 lbs; water, 10 gals. For summer use: (2) Paraffin, 4 pts; soft soap 1-1/2 lbs; water, 10 gals. The Riley Hubbard formula is given for use on scale insects and aphids. A paraffin jelly formula is also given; 8 lbs. of soft soap and 5 gals. of paraffin are boiled together and when boiling add 1 pt. of cold water and stir well. A jelly results on cooling. 10 lbs. of jelly is used to 40 gals of water. The following paraffin-metal emulsions are given: (1) Copper sulphate, 10 ozs; lime water, 8 gals, 3 pts; solar distillate 24 ozs; water 10 gals. (2) Iron sulphate 10 ozs; lime 5 ozs; solar distillate 24 ozs; water, 10 gals. The first formula acts as a fungicide and insecticide, the second as an insecticide only.

1740 [illegible] T[illegible]ey, J. [illegible]

[illegible] scale insects in Arizona.
[illegible] Sta. Bull. [illegible]

Kerosene soap emulsion; kerosene 2 gallons, common soap or whale oil soap, [illegible] lb.; water, 1 gal. [illegible] soap and water solution [illegible] it boiling hot to the kerosene, Churn mixture by means [illegible] force pump. For use [illegible] dilute 1 part emulsion to [illegible] of cold water, [illegible] solution.

1761 1914-Turner, W.F. Ala. Agr. Coll. Expt. Sta. Circ. 28, pp. 105-110. "The Oak Scale and its Control".

Crude oil emulsion 1-7 and 1-9
Kerosene emulsion 1-7 and 1-9
were used in 1911, neither gave any apparent control. March 1912, Schnarr's Insecticide 1-20, Jr. Red Engine and Diamond Paraffin oils at strengths of 3 and 4 % were used. All gave about equal results, killing all scales hit April 1912, Schnarr's Insecticide 1-20, and Diamond Paraffin oil emulsion 4%, were made up with Good's No. 3 soap. Both sprays burned tender foliage, rather severely, Diamond Paraffin emulsion causing the most damage. Jr. Red Engine oil and Diamond Paraffin oil emulsions were prepared according to Yother's formula (Florida Fruit Grower, April 28, 1921).

1782

1920. Vickery, R.K - Jr. Econ. Ent. v. 13, pp. 444.

Physical properties of oils are of little worth in determining insecticidal value because toxicology is fundamentally a chemical study. Oils must be studied as chemicals if our present knowledge is to be improved. No one knows what compounds in petroleum are toxic to insects. V. tested a pure sample of pentane which had the physical properties of gasolene and its vapor proved equally toxic to silkworms. Not all petroleum products are toxic to insects. Kerosene, particularly in California, sometimes fails to kill scale insects. Oil refined for medicinal purposes is not toxic to mosquito larvae according to Freeborn and Atsatt. V. tested a residual oil which failed to kill mosquito larvae. Physiology of Petroleum as an insect poison should be more closely studied. Tissues of Phryganidia californica, killed by exposure to gasolene vapor and prepared histologically differed from untreated tissue only in the condition of the oenocytes which showed great activity in specimens killed by gasolene vapor. V. suggests a respiratory function for the Oenocytes. Petroleum oils penetrate plant tissue about as easily as they enter insect tissues. The miscible oil formula is not adapted to the heavy oils. The heavy fractions of crude oil are no doubt valuable in controlling the evaporation of the more volatile fractions. A blend of distillate and lubricating oil gives the same result. The latest improvement has been with the Colloidal emulsifiers by the use of which admixture with hard water, lime-sulfur and arsenates can be accomplished. The use of a mixture of different colloids gives good spreading and penetration. George P. Gray discovered that the unsaturated petroleum compounds, were, as a class, far more injurious to plants than the saturated series.

1903. Volck, W. H.

1785

Spraying with distillates.

Calif. Agr.Expt.Sta. Bull.153, 31 pp.

The term "distillates" when applied to petroleum products, refers to any oils derived from crude oil by distillation. The oils vary in their composition. The Eastern oils contain paraffin as their solid base and the Western oils asphaltum. Distillation breaks the crude oil into fractions with different boiling points. A table of composition of some distillates is given. Distillates suitable for spraying are those approximating 28° gravity (28°Be). These oils lie between kerosene and the lubricating oils. The 28° distillate may be made by mixing oils of higher and lower gravity or by direct distillation.

The distillates are used in two ways: As emulsions and as mechanical mixtures. Two forms of soap emulsion were devised to overcome the disadvantages of the mechanical process.

The emulsions made with the California oils have not been as satisfactory as those from the Eastern kerosene, and a large amount of damage has been done by separated oil, which rises to the surface in the spraying tanks. Permanent emulsions are prepared by breaking the oil up into fine particles in a fluid which has sufficient surface tension to prevent them from readily reuniting. Milk is a good emulsifier. Soap is the cheapest. Soaps differ much in their emulsifying properties.

The Standard formula for kerosene emulsion is:

	Riley	Cook
Soap	1/2 lb.	1/2 lb.
Water	1 gallon	1 gallon
Oil	2 "	1 qt.
Dilute with water after emulsifying to	30 gals	4 gals.

Other emulsifying materials have been used, such as sour milk, and the juice of such plants as the soap plant. The emulsions have proved unsatisfactory primarily because of the difficulty of obtaining a stable article.

Mechanical Mixtures: There are several types of machinery which may be used to form mechanical emulsions, but they all operate to break up the oil into fine particles and keep it suspended in water by some kind of agitation. These mixtures tend to lessen the injury from the use of oil because the oil separates more quickly and seems to spread out over a relatively greater surface, rather than remain in one large drop.

The distillates are not the only oils having insecticidal properties; in fact, nearly all oils are capable of killing insects; but it is the volatile oils that are most effective, their vapors having far greater penetrating power than the oils in the liquid form. A mixture of oils is apparently more effective than the pure volatile products, which may be explained on the ground that the heavy oils prevent the too rapid dissipation of the volatile parts. While the vapor is doubtless the condition in which oils exhibit their more evident insecticidal effect, the oils are certainly more effective when the liquid comes in immediate contact with the insect.

By far the greatest cause of injury to vegetable tissues is brought about by the penetration of the oils into the interior of the plant. The structure of the leaf has much to do with spreading of the oil over its surface. Also the viscosity retards or hastens this spreading. The condition of the leaf greatly affects the behavior of oils towards it.

Conditions affecting the amount of injury:

1. Quantity of oil: In order to determine more accurately the effects of oils on the plant, small quantities of oil were measured off and applied to leaves of definite sizes. The following results were brought out: (1) The upper surfaces of the leaves were always able to resist amounts of oil which proved fatal when applied to the lower surface of corresponding leaves; but the oil applied to the upper surface had some effect and often caused a slight yellowing of the leaves. (2) When the same amount of oil as was used on a single surface was spread over both surfaces of a similar leaf it often caused the falling of the leaf. (3) When the amount of oil was placed on the under side of the leaves, the result was about the same as when the oil was placed on both surfaces, causing falling and yellowing, whereas similar amounts applied to the upper surface only were but slightly injurious.

2. Character of the oils: Experiments were made to ascertain the effects of oil of different gravities. It was found that the Eastern kerosene was the least injurious to the foliage and that the amount of injury for a given per cent increased very rapidly with the gravity of the oil. The injuries resulting from the distillates are not due to any impurities contained in the oils, but to the oils themselves.

3. The effect of mixed oils: The effects of the mixed oils on the plant are in general very nearly the average of the effects produced by these oils used independently.

4. General and local injury. A series of experiments was made to determine the parts of the plants where oils cause the most injury. These experiments showed that the most important injuries produced by oils are general and not local.

Experiments were made on methods of spraying using a downward spray for the upper surfaces of the leaves and an upward spray for the lower surfaces. In all the work with the downward sprays, the foliage was only slightly injured, but in all the upward spraying and normal spraying experiments the injury was serious. The duration of application is all-important with the oils.

The manner of application has considerable bearing on the penetration of oil into the leaves. Mist sprays seem to be best suitable for distillate work. The humidity of the air largely determines the extent to which the stomata are open, and thus may influence the penetration of oils. Temperature seems to affect penetration, at least it has a very marked effect on the final results.

Nature of injury produced by oils. Two kinds of injury are produced by oils, which may be called chemical and physical.

Physical injuries. The physical injury from oil is due to insulation or sealing-over of parts of the plant, preventing the access of air to the inclosed parts. Insulation is of two kinds, external and internal. The effect of external insulation would necessarily be of two kinds: First, the prevention of the loss of water; and second, the exclusion of the air, the oxygen and carbon dioxide which are essential to plant life.

The effect of oils in internal insulation is much the same as in the external but here individual cells are involved, and consequently another source of injury may exist, namely, that of insulation of the cells from one another. Internal insulation is a more serious problem than external, because it is most liable to occur.

Two types of injury result from insulation and may be classed as rapid and chronic. The rapid injuries depend largely upon the temperature and consist, in the citrus plants, of a rapid falling of the leaves affected, without any apparent change in them. The chronic effect is very different, being much slower. It also brings about a loss of color, a yellowing in the affected parts and consequent lack of growth or other processes, which may result in the fall of the leaf some weeks or months after the application.

Chemical injury by oils.

Oils have a direct chemical effect, induced by their vapor. A general bleaching of the leaves was obtained when they were confined with the vapor from oils.

Resistance of the plant to injury by oils.

All plants are not alike in their response to distillates or oils. The nature of the injury varies with the different plants. All of the injury is not confined to the leaves that drop. The fruit shows the same dropping and yellowing as the leaves. The yellowing is most noticeable in the class of plants to which the prune and apple belong.

Chronic effects are induced by diseased and depleted conditions of the tree in general.

The trouble known as variegated leaf was observed to render the trees affected by it quite sensitive to distillates. Old leaves are very sensitive, being drier than new leaves and in a slow state of vegetative activity. Temperature plays a very active part in the resistance of a plant to distillates. The condition of the plant largely controls its behavior toward distillates.

1925. Wakeland, C.

1791 The fruit tree leaf roller: Its control in southern Idaho by the use of oil emulsion sprays.

Idaho Agr. Expt. Sta. Bul. 137. 11 pp.

Based on extensive experiments in 1923 and 1924, this bulletin is intended to furnish timely information on the preparation and use of oil emulsion sprays for controlling the fruit tree leaf roller in southern Idaho.

Oil sprays were found to be much more effective than lead arsenate, the latter proving of little value though applied in both the prepink and calyx sprays at double the strength ordinarily used for codling moth control. The highest percentage of kill on an individual tree was obtained by Dormoil at a dilution of 6.64 per cent, the highest average percentage of kill occurred when Diamond paraffin oil-potash fish-oil-soap emulsion was used at a dilution of 6.64 per cent, and the lowest individual kill and the lowest average kill were obtained by Dormant Soluble Oil at a dilution of 6.64 per cent. The addition of phenol did not increase the efficiency of the emulsion, and increasing the percentage of the oil gave no better results. In comparative efficiency the three general classes of oil sprays ranked as follows: (1) Home-mixed potash fish-oil-soap emulsion, (2) home-mixed calcium-caseinate emulsion, and (3) commercial oil emulsions. The degree of difference in results with many of the emulsions was so slight that selections of the best oil under practical conditions would be determined largely by price.

1899. Webster, F. M.

1098 Some recent developments in the San Jose scale problem in Ohio.

Proc. 19th Ann.Meet.Soc.Prom.Agr.Sci.for 1898, p.112-9.

During March experiments were made with pure kerosene applied to several varieties of fruit trees. The ill effects of kerosene on trees may or may not become apparent immediately after the application. There seemed to be little difficulty in destroying the scale and injuring the trees. A second series of experiments were made in September, using pure kerosene. All sprayed trees dropped their foliage prematurely, especially the peach, which was nearly denuded of leaves, while others were yet in nearly full leaf. In all the experiments, results failed to show a perfectly safe method of applying undiluted kerosene to orchard trees, except those of the most hardy varieties, and beyond these the danger of injury to the trees was far too great to warrant an unqualified recommendation for its general use.

Weed, H. E.
1072

Entomological Work.
Miss. Expt. Sta. Rpt. 1895 - pp. 69-78.

Kerosene attachment for the knapsack pump.

The first apparatus for themechanical mixing of kerosene and water was designed by Prof. Goff of the Wisc. Station in 1890. In 1894 a modification was described in Bul. 30 of this station. Furthermodifications were described in Bul. 32, published in Dec. 1894. In 1895 a few minor changed were made. Regarding the effect of the mechanical mixture upon insect life, a proportion of 2 parts kerosene to 8 parts water was needed for thoro work with most caterpillars, altho 1-9 will kill many young. 2-8 was required to kill all cabbage worms and all plant lice. The amount of kerosene that foliage would stand was a surprise. The kind of foliage upon which different strengths were applied was apple, pear, peach, plum, cherry, oak, hickory, maple, catalpa, elm, sunflower, cabbage, strawberry, cauliflower, tomato, grape and corn. All would stand 1-9 dilution, and all would stand 2-8 except tomato and sunflower. It was found that it took slightly more kerosene when applied with the mechanical mixer to accomplish the same results in killing insects than was necessary when the emulsion was used. The soap may be the cause of this. The cost of the soap will equal the amount of extra kerosene used. The mechanical mixture is more easily applied. Kerosene kills insects by external contact and it is possible to combine it with other insecticides to increase its effects and also to conbine it with fungicides so that one spraying may check damage being done by insects and by plant diseases. Pyrethrum, Paris green and Bordeaux mixture were used with the mixture. Paris green and Bordeaux did not accomplish their full effects as the combinations did not adhere well to the foliage.

1925. Whitcomb, W.D.

1073 A new formula for making lubricating oil emulsions.

Jr. Econ. Ent. vol 18, no. 1, pp. 274-235

Formula: K-fish oil soap (about 65% water) 1 lb; Fusel oil(Amyl alcohol technical) 4 liquid oz; lubricating oil (Sp. gr. 0.88 - 0.90) 1 gal. water 1/2 gal. Stir the fusel very carefully into the soap, then add the oil slowly with vigorous stirring until the mixture has the appearance and consistency of an oily salve. Stir the water into this selve till a creamy emulsion is formed. The fusel oil must be well stirred into the scap and the ingredients must be added in the sequence given. Pumping is not necessary. Made with red engine oils it will remain stable at least 18 months. Very hard water may need softening before use in this formula. The emulsion is stable in dilute form with Bordeaux mixture and nicotine sulfate. K-fish oil soap and all available grades of lubricating oil have given satisfactory emulsions. Best results have been obtained with oils of 0.88 to 0.90 sp. gr. A hard soap, such as soap flakes, when dissolved in water may be used in place of fish-oil soap. The cost is about 1 cent per gal for 2% oil spray at New Orleans. Good results have been obtained in the control of camphor scale, Florida Red Scale, Dictyospermum scale, Purple scale, the long scale and the Palm or cocoanut mealybug. In the majority of cases emulsions made by this formula are more effective than the standard boiled-pumped lubricating oil emulsions indicating some insecticidal value of the fusel oil. It is no more injurious to plants than the boiled emulsions.

1074

Contribution to the Study of Insecticide Mixtures
With a Base of Insoluble Oil.

By

Fernand Willaume.

In Revue de Pathologie Végétale et Entomologie Agricole,
Vol. XII, No. 3, July-Sept., 1925. pp. 225-237.

Among the mixtures that can be made on the farm, those which contain the insoluble mineral oils possess great efficiency for the scales of fruit trees. (Apples and pears). This efficiency has been known a long time (see Marchal P. ___ Experiments on the destruction of injurious Diaspides on fruit

trees. [illegible] l'Institut [illegible] 19[illegible]-19[illegible]). It [illegible] been checked by the recent tests of [illegible], [illegible], Fontiers, and [illegible]: Winter treatments against the orange scales (C.R.Acad. Agric.,t.XI). In 1925, in collaboration with the Agricultural [illegible] we made a certain number of comparative tests, using 20 formulas (alkaline mixtures; lime-sulphur mixtures; commercial mixtures with a base of soluble tar; mixtures with a base of kerosene, of anthracene oil, of cresyl, of phenol, of oil of turpentine, etc., used as covering mixtures), tests which confirmed the superiority of mineral oils for the destruction of scales. Two commercial soluble mixtures appeared to be equal but were more costly. Unfortunately, their use meets certain obstacles.

In the present work, we will explain at first the procedure that appears to us to give the best results for making the mixtures in question: Afterwards some new applications relating to the analyses of these methods, applications which enlarge the very restricted number of practical formulas.

I. Analysis of methods for the preparation of practical mixtures with a base of insoluble oil.

The best formulas which have been prepared until the present are, in our opinion, the three following. The formulas perfected in America through long practice are not considered here, because they are difficult to adapt to our methods of application which differ from those used in America. Besides, they do not generally give results with certain oils such as anthracene, and require the use of products little known to us, as fish oil soap.

We will give these formulas below from memory, the last two being, we believe, unpublished in France.

The Riley formula was at first made as follows: (see P. Marchal: The Biological Sciences applied to Agriculture in the United States).

Fish oil soap ------------------------	10 lbs
Caustic potash or soda ---------------	2 "
Water --------------------------------	88 gals.
Petroleum (crude oil at 16° or 20° Be)-	10 "

(The soap is dissolved in the hot water, but the addition of the petroleum is made only after complete dilution and addition of the caustic potash).

This formula has since been replaced by the following, becoming the [illegible]:

Paraffin or lubricating oil -----------	2 gals.
Water ---------------------------------	1 "
Caustic potash fish oil soap ----------	2 lbs.
Stabilizer ----------------------------	1 "

The whole is heated until boiling in any vessel, afterwards diluting at the time of using in 200 gallons of water or lime-sulphur.

The stabilizer can be for example: 1 lb. of glue, 8 oz. of casein, 1 lb.of cooking wheat flour, etc. (Yothers, W.W. and Winston, J.R.: Mixing emulsified mineral lubricating oils with deep-well waters and lime sulphur solutions, U.S.D.A. Bul. 1217, 1924).

One other formula has been proposed by Melander, Spuler and Green (Oil Sprays, Their Preparation and Use for Insect Control. Washington Agr. Expt.Sta. Bul. 1[illegible], 1924), which uses as an emulsifier a soap made by dissolving 5 volumes of potassium fish oil soap, devoid of free alkali and having 30 % water, in 4 volumes of cresol (crude cresylic acid 97-99%). The proportions adapted are 10 parts ~~ax~~ to 100 of this soap for 90 per 100 (in pounds) of lubricating oil. Four gallons or one-fourth of this mixture are made up to 100 gallons by the addition of water.

This formula necessitates no heating, but it does not work successfully with hard water.

One other formula proposed by Whitcomb (A New Formula for Making Lubricating Oil Emulsions, Journ. Econ. Ent. Vol.12, No.1) adds besides fish oil soap some amyl alcohol or fusel oil.

Gastine formula:

Water	10 liters
Powder of soapberry	20 gms.
Neutral copper acetate	100 ".
Mixture of heavy oil and petrol (kerosene) of the same density as the emulsified liquid	200 ccm.

At first make the mixture of heavy oil and kerosene, next add the decoction of soapberry, as far as possible hot, and finally the copper acetate).

Trabut formula:

Damaged flour	1 kilo
Crude petroleum	5 liters
Water	100 to 200 liters.

Mix the flour with care in the petroleum; when the mixture forms a paste, add, while agitating 1/20 of a liter of water, if possible boiling; agitate vigorously until made up to 100 or 200 liters according to use. (Trabut: The defense against scales and other fixed insects. Algeria.)

Paillot formula:

Copper sulphate	2 kilos
Hydrated lime	4 "
Petrol (kerosene) or anthracene oil or used lubricating oil	10 liters
Water	90 "

The Paillot formula, very near as regards the kerosene to that of Galloway and Marlatt (see E. Bourcart. The diseases of plants, O. Doin, editor), or of certain English formulas with paraffin oils, improves especially the latter by the modification in the manner of making the preparation. The copper sulphate is dissolved previously in 25 liters of water, a thick milk of lime is prepared in another container and the oil is emulsified in it. Then the preparation is poured, slightly mixed with water, into the solution of copper sulphate until a volume of 100 liters is reached.

With kerosene the emulsion is more difficult to make than with anthracene; the author recommends mixing the lime with boiling water. This emulsion is more stable than that obtained with soap, which was formerly noticed by Bourcart for the formula of Galloway and Marlatt.

For more of the details, see A. Paillot. On the preparation of mineral oils in copper mixtures for the winter treatment of fruit trees (C. R. Acad. Agric., Vol. X.).

The principle of the Gastine preparation consists in mixing a heavy mineral oil (heavy mineral oil of density 1.05) with a light oil (ordinary kerosene, density 0.80) in order to obtain a complex similar to that of the emulsifying liquid. This liquid was in the proposed formula a solution of copper acetate in addition to the saponin. The choice of copper acetate complicates the true mechanism, but we may here neglect the role of this compound.

It is evident that the stability of the emulsion, that is to say, the maintenance of the oil in droplets which are neither agregated nor united, is obtained by the saponin in which role it resembles that of casein in milk; lowering the surface tension of the water and permitting it to moisten the drops of oil. It forms layers of liquid around these drops which adhere and form insulating sheaths. In our opinion, there would then be an absorption of the colloidal micellae of the pseu-soluble emulsifiers according to a mechanism absolutely comparable to that which we will explain further on for the insoluble and powdery emulsifiers). According to certain authors, surface tensions as close as possible for the dispersed liquid and the emulsifier would favor the emulsion.

This we shall call the stability of the suspension, that is, the maintenance of a homogeneous distribution of the droplets in the surrounding liquid, resulting from the similarity of the density between the dispersed liquid and the emulsifier. The Gastine formula is, to our knowledge, the only one which takes into account the density factor in which the role is not, however, negligible. An example of omission where generally one does not consider the influence of density is given by the three formulas which follow where variable proportions of oils of different density which are lighter or heavier than water, are emulsified with equal quantities of the same emulsifier and where there is nothing provided to assure a good suspension of the obtained globules.

1st - Formula of Mattareeb

Tar oil ------------------------	1 kilogram
Soap ---------------------------	1 "
Water --------------------------	98 liters

2nd - Formula of Langlois

Heavy gas oil (from coal) --------	5 kilograms
Black soap ----------------------	1 "
Water -----------------------------	94 liters

3rd - Formula of Rathay

Kerosene -----------------------	1 liter
Black soap ----------------------	1 kilogram
Water --------------------------	100 liters.

If in reality in the laboratory very lively mechanical agitation, with small volumes of liquid, permits one to obtain a very fine division of the oil by emulsifying, it is never the same when it is necessary to prepare a large amount of the emulsion in the field. The emulsion obtained by a forced whipping movement (The process used in the well known Riley formula which consists of passing the stock emulsion repeatedly thru the nozzle of a sprayer is impracticable on a large scale for the distribution of the oil particles) is thicker, its contact surface with the emulsifying liquid is diminished as well as the resistance which it opposes to the movement of the globules. The resistance with which a liquid opposes the movement of a substance depends on two factors; (1) The mass of portions of a liquid which are displaced at the same time as the substance, and (2) the viscosity of the fluid which interferes according to the friction of the layers of the fluid when same are displaced with regard to the others (Ch. Maurain: The Physical States of Matter. F. Alcan, editor). For small speeds the influence of the second factor is entirely predominating in the case of small spheres.

In applying Stockes law to these spheres we have $V = \frac{2}{9}g \cdot \frac{R^2(D-d)}{v}$

V = speed of displacement of the sphere, g= intensity of gravity, R = radius of the sphere, D = density of the sphere, d = density of the fluid, v = viscosity of the fluid.

The conditions of equilibrium of the emulsions of the Gastine type may be deducted immediately from this equation. In order that V may be as small as possible, R must ~~at~~ be small, D as close as possible to d, and v very large.

The Gastine [illegible] v.)

[illegible] under consideration be not very viscous (which is difficult to [illegible] the practice of insecticide emulsions), the emulsions where [illegible] difference of density between the dispersed liquid and the emulsifier [illegible], of the order of magnitude of that which separates the densities of water and of kerosene), gives suspensions of a very fugitive homogenity . When one [uses] kerosene the globules rise quickly to the surface; the largest at first, the smallest following; with a heavy oil, on the contrary, one obtains a rapid settling. Both arrange themselves furthermore with difficulty in suspension when one stirs up the dispersing liquid, which, so to speak, "has little holding power" on the surface of the globules.

The uniformity of the density considered by Gastine, appears to us then the factor most convenient to use in working for the success of an emulsion with the mechanism studied and when one uses the emulsion in the field. (The kerosene formulas which are made up with hot water seem to conform empirically to our view. In heating the water which is to be used for emulsifying, its viscosity is diminished but one diminishes also its density with regard to kerosene; the best results obtained by this practice showed the predominance of the density factor over the viscosity factor. It should also be noted that hot water has a smaller surface tension than cold water, but the presence of soap or other materials appearing in these formulas, renders this difference hardly noticeable).

The mechanism of the Trabut formula is very different from that of the preceding. The kerosene is at first divided mechanically when it is mixed with flour. The addition of water and the consecutive agitation easily completes a good emulsion. The latter is stabilized by the particles of flour which adhere to the droplets of kerosene, maintaining them at a distance considerably greater in regard to the radius of molecular action and preventing them from uniting. The microscopic examination easily shows the flour particles adhering to the droplets.

The suspension is, on the other hand, doubly improved: by the increase of the function of the forces of friction which are opposed to the movement of the complex particles of flour and kerosene droplets, and by the increase of weight which this complex presents, in relation to the very light pure kerosene. From this point of view, the Trabut formula, used with ordinary kerosene, should be modified as follows to give the optimum result.

Kerosene ---------------------------- 5 liters
Flour -------------------------------- 4 kilograms.

(The word kerosene or petrol signifies here as well as in all the formulas which follow, ordinary rectified kerosene (density 0.78 to 0.81) and is often sold under trade names such as Luciline, Oriflamme, etc. Crude petroleum has a density nearer to that of water, namely, 0.97).

The distribution of the flour on the globules of kerosene is not absolutely constant; one part of the complex falls slowly on account of a slight excess of flour, the other part has the opposite movement. Both parts return very easily to a homogeneous suspension.

The preparation must nevertheless be used soon for the flour particles gather into flocculent masses which would become in time difficult to break.

This formula is the least expensive and the most practical that has been established for the use of kerosene in simple emulsions. (According to the same principle Trabut proposed another formula:

Clay ---------------------------------- 2 kilograms
Crude petroleum ------------------------ 5 liters.

The clay is first made into paste form with water. The emulsion is perfect but the suspension is not sufficient with ordinary kerosene. The [illegible] of clay

which is able to fix the globules does not materially counteract the influence of their de

[illegible] Vol. 1[illegible] No. 3), and by L. English (A preliminary report on the [illegible] insecticide emulsions with colloidal clay, Journ. Econ. Ent., Vol. 1[illegible] No. 3). This last author, like the preceding ones, even if he does not know the work of Trabut, does not seem to take into account the mechanical action which his own formula produces. In fact, he recommends the preparation of the suspension of clay one day in advance, so that the pseudosolution will be complete. Then, after having made the emulsion of oil, he recognizes that the addition of an electrolyte, as sodium carbonate, improves the stability of the suspension. Now, this addition acts by causing the precipitation of the fine clay of the suspension, that is to say, destroys all the work of the pseudosolution which was made beforehand. This formula is far inferior to that of Trabut, and is absolutely irrational. It shows the errors which can result from a work which is entirely empirical. For solutions with a base of solid and powdery emulsifiers see note on page 19.

As a whole, the principle used in the Trabut formula causes the same factors to act as those which govern the Gastine formula, namely, the density of the dispersed liquid, in relation to the emulsifier, and the increase of its contact surface with the surrounding liquid. By using different means the importance of the first factor is practically diminished, whereas the second is never solely the result of a mechanical agitation. (The Stockes formula is not further applicable on account of the movement of the globules surrounded by their solid periglobular layer. The irregularity of this layer must involve rotating movements which may interpose that which physicists call the rigidity of surrounding liquids (Schwedoff). The question demands deep study.

The principle of the Paillot formula is from the first like the preceding, though more complicated as to mechanism.

Struck by good properties which we obtained with this formula, and on the contrary, by the repeated attempts which we made to prepare the anthracene oil emulsions without copper sulphate, even in the presence of considerable quantities of a second emulsifying liquid, such as sodium soluble oil, we have attempted to analyze the phenomena which are produced during the different manipulations recommended by Paillot.

A. Function of the lime: The oil is divided mechanically when one pours it into the paste formed by the bolted lime previously moistened with water. On agitating the mixture this mechanical action is increased and a sufficient division of the oil is obtained with one operation comparable to that which takes place in the Trabut formula.

[illegible] mixes slaked lime and anthracene oil, the saturated lime [illegible] ces on the globules held mechanically, a beginning of saponification. This [illegible] visible [illegible] adds an excess of water; the latter is rose colored by the saponified and soluble part of the oil (a phenomenon analogous to that which is produced in the composition of Rubina of Berlese). At the same time that the water becomes rose colored the anthracene oil seems to become extremely viscous, the globules of oil collecting in masses which adhere strongly to the sides of the container. It is then impossible to remake an emulsion even in the laboratory. In the formula where the lime is simply moistened, the saponification is not produced, so to speak, and the particles of lime in excess adhere strongly to the surface of the globules, forming around them a solid barrier which is easy to see under the microscope. The useful role of this much reduced saponification seems not to be noticeable. We have been able in fact to revive this mechanism with some inactive bodies (calcium carbonate, etc.).

Function of the copper sulphate: When one mixes the emulsion of anthracene oil composed of globules covered with particles of lime in the copper sulphate, the latter gives with the lime a periglobular precipitate of copper hydroxide (with regard to the composition of this precipitate, (consult what Foex has published in the Revue de Viticulture, Vol. LV, No. 1410 and later numbers) which remains strongly adherent.) (One obtains in all a complex comparable to the colloidal mixtures, which must result also in the English formulas [illegible] oil:

Iron sulphate	625 gms.
Lime	300 "
Distilled paraffin	1 kg. to 1.4 kg.
Rain water	100 cc.

or then

Copper sulphate	1.6 kg.
Quick lime	250 to 500 kg.
Distilled paraffin	6.5 liters
Rain water	100 liters
Caustic soda	2 kg. to 2.5 kg.

And in all other formulas where one mixes an oil and an insoluble powdery body). It is this precipitate which assures the very great stability of the emulsion and a satisfactory suspension of the globules. It not only insulates perfectly the globules one from another, but also by the increase of the contact surface between the complex which they form with the globules and the surrounding liquid, reduces the movements of this complex.

The function of copper sulphate does not stop here. Until the present, in fact, the Paillot formula does not seem to present a serious advantage over the more simple formula of Trabut. Nor is it noted, to the contrary, that the suspension is more stable. We have been able on the other hand to renew the mechanical studies with different substances. It is easy to replace, for example, the copper sulphate with iron sulphate (the density of copper sulphate is 2.25; that of iron sulphate 1.88) but the result is not so good. With lime and sulphuric acid the reverse is still more sensible and the result is no better than if one uses plaster of Paris directly in the Trabut formula.

We have been able on the contrary to obtain a suspension presenting the same striking characters of relative stability with calcium arsenate used directly. All these experiments showed that the said stability does not depend on the special mechanism employed and seems largely independent of the density of the emulsion.

This last proposition is again supported by the fact that one does not improve the [illegible]ion obtained with the indicated quantities of lime and copper on using [illegible] anthracene and kerosene oils (4 liters + 4 liters for example) although [illegible] n the pure anthracene. The influence of the density never reappears if [illegible] quantity of solid emulsifier used. In the conditions of the formula it is found then hidden in part by a special property of the emulsifier.

This property is connected according to our view with the electrical phenomena. (Comparable with those which have been studied in the colloidal solutions. The influence of the phenomena has been shown to us again by the fact that in dissolving the emulsion, that is, in separating the globules from each other, one obtains a more rapid sedimentation).

In concluding, this last principle, like the previous, multiplies automatically like them, the contact surface between the dispersed liquid and emulsifier. Its distinctive character is the relative obliteration of the density factor before a new effective agent resulting probably from the action of the free electric forces on the surface of the solid periglobular layer.

II. New formulas established according to the principles studied.

From the preceding theoretical study, we have already derived several practical applications.

A. Soluble or pseudo-soluble emulsifiers. We have attempted to use anthracene oil in which we were able to notice the action on woolly aphids. The ordinary emulsions hardly wet this aphid, but the trees once cleared have escaped during the spring from the reinvasion, which was produced slowly and without vigor.

The emulsifier experiments were the following: Negative tests: Gelatine, soap, sodium carbonate, sodium soluble oils and in general all the alkaline bodies. Reactions analagous to those which we have described for lime were produced with [illegible].

Positive results have been given, on the contrary, by saponin and by gum arabic. (Saponin is very expensive at the druggist's and costs on an average 8 francs per 50 gms. One may obtain it in the field just as Vermorel and Dantony found, by making a decoction of the outer husk of dried horse chestnuts (at least 500 gms), or by macerating 150 gms of Panama wood for a few days in 700 gms of 90% alcohol. The gum arabic costs 6-1/2 francs per kilogram, retail, and 5-3/4 francs per kilo in purchases of 100 kilos.

The equality of density between the emulsion and the surrounding liquid has been obtained by a suitable mixture of anthracene oil (density 1.08) and kerosene (density 0.80). Always pour the heavy oil into the light one.

Finally methyl alcohol has been added principally for the wetting of the aphids. The alcohol dissolves the waxy down with which they are covered. It also facilitates the emulsion and helps to dissolve the saponin.

Our tests have resulted from the following formula with saponin.

I

a) Kerosene ------- 1-1/2 liters
   Anthracene ----- 3-1/2 liters

b) Alcohol 90% ---- 3 liters
   Saponin ------- 50 gms.

The second preparation is stirred into the first and mixed well with it. When ready to use it is diluted in about 13 volumes, little by little, and agitating it vigorously. The emulsion obtained is very fine, very stable (it has not changed after four months) and maintains itself very long in suspension ([illegible] Daillot formula), when the outside temperature is near 15 degrees. The globules [illegible] down slowly when it falls below this or, on the contrary, reach the surface when the temperature rises some degrees. The cost is about 75 francs for 100 liters.

A second formula has been made by replacing the saponin with a solution of gum arabic:

II	[illegible]	1 [illegible]
	Anthracene	3.5 liters
	Alcohol	3 liters
	Gum arabic	1.5 kilo
	Water	15 liters
	Make up to	100 liters.

The first three substances well mixed are easily emulsified in the gum arabic solution. (The solution might be made in the cold by allowing the gum arabic to steep some days in advance or by heating. It is then allowed to cool). When ready for use it is made up to 100 liters with stirring. The cost is about equal to that of the preceding emulsions. (A third formula has been made with coal oil (density 1.001) It calls for the following proportions: Gum arabic 4.5% solution, 7 to 8 liters; coal oil (huile de schiste), 10 liters; water to make 100 liters. But the action of the coal oil has not been studied sufficiently yet on insects and vegetation).

Utilization of proposed formulas I and II.

The best time of application of emulsions with a mineral oil base does not always coincide with that of fungicidal mixtures; the toxicity of mineral materials for trees necessitates using them only in a period of dormancy. The copper emulsions, on the one hand, are often sprayed to advantage in the spring just at the period when vegetation starts. The method of application is not the same. The insecticide needs to be projected in violent jets, the winter treatment being a sort of washing from which it devolves into a mechanical role. For the fungicide, on the contrary, a fine pulverization without great force and with the smallest amount of liquid is sufficient. The considerations tend to prove that a mixed treatment is not always the most economical (loss of fungicide by using too much and sometimes at a too early date), giving in the proposed formulas a certain advantage in a great number of cases. The presence of alcohol makes them also more effective against the woolly aphid.

We have used formula II with success by spraying against a maple aphid (genus Chetophorus). One very large colony has been killed very rapidly and the aphids dispersed on the leaves in the vicinity, migrating never to return during the summer. The leafy stem, though carrying some traces of burning, continued its growth normally. It seems then that in reducing the total quantity of oil one may hope, on account of the fineness of the emulsion, to make the anthracene tolerable to the plant in full growth. In all cases the use of this spray during the period of growth is quite possible.

The stability of the suspensions which one may obtain with these formulas (notably formula I) should permit also of their use with a self-feeding brush (a kind of brush for the cleaning of coaches) of which we studied the principle with B. Trouvelot, and who had for a preliminary container a pressure sprayer in which a regular mixing of the liquid was difficult to secure.

The reduced consumption, added to the mechanical action of the rapidly moving brushes (with little fatigue) seems to reserve for this apparatus some possibilities for use and justifies the consideration which we have given it here.

The first disadvantage of Formula I and II rests in the instability with respect to the two densities, of the dispersed liquid and the emulsifier according to the temperature, an instability which will require modifications of the proportions of the two oil constituents in relation with the outside temperature.

Some tables could, however, be arranged for practical use and avoid all delicate manipulation, the formula being very easy to make from the initial dosage. A second disadvantage is common to all the formulas made by the aid of liquid emulsifiers, soap, soluble casein, saponin, etc.

The presence of these bodies, in fact, prevents the oil droplets from fusing, that is, from wetting each other, but since we have shown in some parallel tests on the "ability to wet", the surface tension of chitin is near to that of fat bodies, the oil thus emulsified does not wet the insects though the liquid emulsifier is not evaporated. A large part of the insecticide slides off and is lost.

De Ong and Knight by the direct experiment method have shown in fact that the efficiency of oil increases when one diminishes the quantity of the emulsifier, calcium caseinate, or soap. (De Ong, E. R., and Knight, H. ___ Emulsifying agents as an inhibiting factor in oil sprays, Journ. Econ. Ent. Vol. 18, April, 1925).

The theory given above is then in accord with the practice, but the preceding authors concluded wrongly according to our information when they recommended granting such great importance to the mechanical role in the emulsification of insecticide oils. We have seen to the contrary that practically this role ought to be reduced to the minimum. There exists a process more preferable for surmounting the inconvenience which we wish to show. It consists in applying the emulsions in direct jets close up and under high pressure. The emulsion breaks on contact, (it is the process used for transforming the greasy emulsions from buttermilk) and wets very well, the excess running off without danger of burning by accumulation of oil in a favorable place. One very simple experiment shows the live force of the globules. It consists in placing a drop of the emulsion on a sheet of paper then letting another drop fall on the same sheet from rather a great height. In turning the sheet one finds that the globules of oil of the first drop have not wet the paper which is not penetrated whereas the oil appears on the reverse of the position of the second drop.

A similar result is obtained with a nozzle owing to the direct pressure used. Either practice agrees perfectly with the needs of a winter treatment.

B. Insoluble and powdery emulsifiers. We will resume again in this paragraph the list of negative tests made with a certain number of powdery materials.

With flowers of sulphur the emulsion is impossible; the anthracene oil sets in a mass when it is poured into the moistened powder and which is delayed after a very rapid agitation. We have made the flowers of sulphur wettable by using saponin or alcohol. We have poured into this sulphur greatly diluted oil emulsions made up with lime, with saponin or simply with water rapidly stirred. It has always resulted in a lumpy precipitation, formed by agglomerated particles of oil and of adhering sulphur powder. We have tried without better success mixtures of sulphur and powdered lime which were moistened or not moistened in the first oil emulsion.

Some trials were made with kerosene.

Other negative trials were made with talc, phosphate precipitate, and calcium cyanamide from a lead mine.

One unstable emulsion has been obtained with plaster of Paris (Furthermore plaster of Paris clogs the nozzles of the sprayer).

On the other hand a certain number of formulas have been established:

The Trabut modified formula with flour:

III	Kerosene	5 liters
	Flour	4 kgr
	Water	100 liters

The following formula for the use of anthracene oil heavier than water:

IV	Anthracene oil	1.5 liters
	Kerosene	3.5 "
	Flour	2 kgr
	Water	50 to 100 liters.

The mixture of the two oils is made as for formulas I and II and this mixture

With kaolin:

V	Anthracene oil	6.5 liters
	Kerosene	3.5 "
	Kaolin	2 kgr
	Water	100 to 200 liters

The mixture of the two oils is effected first then emulsified in the kaolin moistened with water.

(The kaolin in combination with calcium sulphide and calcium arsenate may be utilized for emulsifying Schist oil. One to two kilograms may suffice. The action of the oil on insects is little known, as we have already pointed out).

With Calcium sulphide:

VI.	Anthracene oil	6 liters
	Kerosene	4 "
	Calcium sulphide	2 kgr
	Water	100 to 200 liters.

The mixture of the two oils is effected first then emulsified in the calcium sulphide moistened with water.

With iron sulphate:

VII.	Anthracene oil	7 liters
	Kerosene oil	3 "
	Lime	1 kgr
	Iron sulphate	1 "
	Water	100 to 200 liters.

Same manipulation as for the Paillot formula, after mixing the two oils. If one wishes to avoid this last, adopt the following proportions.

VIII.	Anthracene oil	10 liters
	Lime	4 kgs
	Iron sulphate	2 "
	Water	100 liters,

and apply exactly as in the Paillot process.

With calcium arsenate: (The use of solid bodies in the spray for emulsions of insoluble oils has been pointed out without any detail in an excellent Belgian paper of T. Vernieuwe. (The enemies of our fruit trees and the means of combatting them. Brussels 1915.) One finds therein indicated, lead arsenate and calcium arsenate as well as flour and starch as emulsifiers of paraffin oils. But no formula for their use is given, except those of the previously known English formulas.),

IX	Anthracene oil	6.5 liters
	Kerosene	3.5 "
	Calcium arsenate	2 kgs.
	Water	100 to 200 liters.

The mixture of the two oils is effected first, afterwards emulsifying in the moist calcium arsenate.

If one wishes to avoid the mixing of the two oils it is necessary to increase as before the quantity of emulsifier so as to cover the influence of the density.

X	Anthracene oil	10 liters
	Calcium arsenate	4 kgs.
	Water	100 liters.

In all these formulas it is advisable to add 1% of methyl alcohol if one has noticed the presence of woolly aphids on the trees to be treated.

Criticisms of formulas III, IV and those following.

The formulas with insoluble oil bases emulsified with pulverized solid materials do not present, from the point of view of application, the same needs as the Gastine type formulas. The emulsions break much more easily in contact with trees and insects.

On the other hand, the experiences of Paillot, confirmed by the tests made in America, (Winston, J. R., Bowman, J. and Yothers, W. W., Bordeaux oil emulsions, U. S. D. A. Bul. 1178, Nov. 1923, and the Condeminal formula of Bordeaux mixture with linseed oil (Progres Agricole et Viticole, March 5, 1911) have shown that the copper, used in this way, keeps its fungicidal properties. Some French and American authors have found that by adding 1% oil the Bordeaux mixture adhères better than the Bordeaux alone. This increase of adherence is confirmed by our own experiences as far as the Bordeaux mixture with 10% kerosene is concerned. (See also Hood, C. E. - Fish oil, an efficient adhesive in arsenate of lead sprays and results with other substances used. Jour. Econ. Ent. Vol. 18, No. 2, April, 1925).

It does not remove the objection which we have already given with respect to the time and opportunity of insecticide and fungicide treatments. In the case where these treatments do not coincide it is of advantage to possess some formulas either less expensive or more simple or more effective against insects or indeed less injurious to the trees. The last two qualities should further secure in every case the decision for the formulas which possess them.

All the emulsions proposed adhere as well as that of Paillot, the solid peri-globular layer resisting badly from the impacts on account of its discontinuity.

Formula III which only includes some kerosene as the active material might give service when one experiences difficulty in procuring anthracene oil. It is one of the simplest formulas known and the least injurious. The suspension is unstable enough as we have already said, but a slight mixing suffices for maintaining it.

Formula IV is very near the preceding but has the advantage over it of containing a small quantity of anthracene oil which appears more active than the kerosene.

Formula V gives a good suspension which does not gradually flocculate like the preceding when one leaves it. The preparation is very simple, and the cost is very low. Finally, the amount of anthracene oil is greater than that of kerosene.

Formula VI does not give as good a suspension and it flocculates. It appears nevertheless interesting on account of the insecticidal function of calcium sulphide which strengthens the proper action of the oil. Its action on the trees remains to be studied.

Formula VII, cheaper than that of Paillot, should present only slight fungicidal qualities.

The action of iron sulphate on the plant must be compared in these respects with that of copper sulphate, but because of the experiments already performed on this subject, it seems the superiority of copper sulphate may not be denied.

Formula VIII similar to the preceding possesses like that only the advantage of cheapness but to a much smaller degree.

Formula IX is, like V, one of those which gives the best suspensions, and is very simple to prepare. It is not very costly, and it is possible that the emulsifier [illegible] play in some cases an important insecticidal role.

The same may be said of formula X which uses pure anthracene oil. In this formula the electric [illegible] the action of gravity as in the Paillot formula, but [illegible] on the tree or on [illegible] point of view.

Conclusions.

The principles which may guide the preparation of insoluble oil emulsions in the insecticide solutions very often appear disregarded in the formulas which are given to the farmers.

The majority of the processes recommended for the use of kerosene, of anthracene oil, etc., give in the ordinary practice only coarse and very unstable suspensions, although they nearly always require the heating of one part of the utilized liquid and some delicate manipulations. These discourage the farmers who moreover risk, in using the imperfect emulsions, disturbing the growth of the plants treated or assuring only incomplete protection to them.

After many hundreds of experiments and a brief analysis of the processes used, we have selected a certain number of old formulas (three in number) or new ones (ten in number) which indicate the principles that may guide the users, while waiting for more definite knowledge.

It would be a great mistake if one wished to apply mechanical means to insecticide emulsions which are prepared on the farm, and which only give good ~~xxx~~ results in a specially equipped factory. To compare such emulsions made by mechanical means, which do not give good results, with industrial emulsions is a grave mistake. The first are based on the human scale, and the second belong to the microscopic world and the laws which govern them are different.

In agricultural practice, it is necessary to take into account globules of oil of a certain dimension which are obtained by very much restricted mechanical means.

In order to obtain a good emulsion, one may use either soluble or pseudo-soluble emulsifiers or insoluble powdery emulsifiers, their function being to isolate the globules of oil. In the first case a sufficient suspension (that is, comparable to that of an average Bordeaux mixture), is mainly depending on the density of the oil, the influence of the mass of the liquid layer isolating the globule being negligible. In the second case, it is, to the contrary, the mass or the electric charge which permits the coating and masking of the effects of the globular mass.

As far as the method of application is concerned, the emulsion obtained with the soluble emulsifiers must be broken up very finely with a violent spray alone capable of breaking the emulsion. The emulsions containing powdery emulsifiers can be utilized in very fine sprays, whereby the emulsion breaks up more easily than the preceding ones.

In a general way the second emulsion does not require a dosage as correct as the first; they are also more coarse, but with them a lesser agitation is necessary in the spray tank than for the ordinary Bordeaux mixtures.

Our opinion is that this last emulsion merits the greatest consideration from the practical point of view and will facilitate the general use of insoluble oils.

The efficiency of the above compared formulas (These formulas do not pretend to exhaust the possibilities which can be considered in the application of insoluble emulsifying agents. A large field of research is still open), will determine its selection and its mode of application depending on the insect to be treated. The experiments in the field will be followed up in the coming winter.

1924. Woglum, R. S.

1911 The value of sprays compared with fumigation for the resistant black scale.

California Fruit Growers' Exchange, Field Dept.Circ.118, 4 pp.

Of the various insecticides used, three oil emulsions, Triumph oil with liquid lime sulphur, Sherwin Williams spray-emulsion with dry lime sulphur, and Volck showed better average results than one fumigation. Of these three a late autumn application of 1 - 1-1/2 % Triumph oil with 2% lime sulphur and casein appeared to be the most effective, and one of the cheapest. The Sherwin Williams spray-emulsion and dry lime sulphur was better than the Volck. The results with the Volck were rather irregular, due in a large part to the use of too dilute mixtures in an effort to keep down the costs.

The use of oil-sulphur mixtures appeared to give considerable injury to the fruit and foliage in some orchards during June and July. Spraying with Triumph oil - lime sulphur was done with comparative safety between the last of September and January. No injury of any kind was noticed from the use of Volck, regardless of temperature and concentration. This lack of injury favors Volck over other sprays for summer or hot weather spraying for Black scale, though it is no more effective than Triumph - lime sulphur and at a proper strength is more expensive. Triumph-lime sulphur has been commercially effective at 1-1/4 - 1-1/2 % oil and appears reasonably safe for late spraying.

A special spray known as Sherwin Williams Citro-emulsion is very injurious and growers are warned against its use.

1923. Woodard, J. S.

1916 Obscure scale on pecan.

16th Ann.Rept.Commissioner of Agriculture of the State of Texas, pp.29-31.

About 65 pecan trees were sprayed with oil emulsion composed of 1 lb. of fish oil soap, 1 gal. of red engine oil or Paraffin oil, and 1/4 pt. lye to 8 gals. of water. The soap was dissolved in 1 gal. of water by boiling, then the oil was added and thoroly stirred until emulsified. The lye was dissolved in 7 gals. of water and the hot soap, oil and water all mixed and stirred and applied while hot. Another 65 trees were sprayed with heavy black engine oil. It was mixed in the same proportions with soap, lye and water. Both sprays seemed to kill the scale and did not injure the trees. The heavy engine oil was least desirable to use because it clogged the nozzles. One tree was sprayed with pure kerosene and the tree never showed any signs of life when the growing season came. Another tree was sprayed with crude petroleum. The scales were killed but the tree died later. Undiluted crank case oil killed a tree. The amount of water was doubled in the first emulsion and the same amounts of soap and oil ~~was~~ used. This did not injure the trees but did not kill all the scales.

1889. Woodworth, C. W.

1921 [illegible] Notes, Arkansas Agr. Expt. Expt. Sta. [illegible]

In An emulsion with milk or soap, oil loses a portion of its value as an insecticide.

(1) kerosene 2 gallons; milk, 1 gal. (2) kerosene, 2 gals; condensed milk four cans;; water, 8 cans, the milk and water making 9 pints. (3) kerosene, 2 gals., common soap or whale-oil soap ½ lb, water 1 gal. Fresh milk curdles and the emulsion becomes thicker and harder and requires stirring. If sour milk is used no further action occurs. Dry method of using kerosene consists in adding the proper amount of kerosene to any convenient powder, as road dust, land plaster, floats, meal and flour. The per cent oil that may be used depends upon the finess of the powder. All of the above powders will hold from 5 to 10 per cent oil. It will not injure plants and may be used against plant lice and the [illegible] cucumber beetle. Apply in the early morning when the dew is [illegible].

1896. Woodworth, C. W.

1924 Remedies for insects and fungi.
California Agr. Expt Sta. Bull. 115. 15 p.

With a kerosene and water mixture use a nozzle which will produce a very fine mist. Hold nozzle as far as possible from plant. Pure kerosene has great penetrating power, perhaps the greatest of all the insecticides. Kerosene emulsion: 2 parts kerosene to 1 part of sour milk or of strong soap solution. The latter must be boiling hot when the kerosene is added. This must be pumped thru a nozzle for 15 minutes.

Woodworth, C. W.

1925 Sprays and washes. California Agr. Expt. Sta. Rpt. 1898, pp. [illegible].

Kerosene 3 pints, sour milk, 1½ pints, or soap, 1½ ounce.

This emulsification is sufficient stock for 5 gallons of dilute [illegible]

Kerosene, 3 gallons, sour milk, 1½ ~~pints~~ gallons or 3/4 lb.

[illegible] soap. [illegible] is sufficient for 40 gallons of spray. An emulsion [illegible]

1[illegible]8. [illegible]

1926 [illegible] for insects and fungi.

Rpt. Agr. Expt. Univ. Calif. pp. 213- 231.

Kerosene and water mixtures must be used with caution. Use a nozzle capable of producing a very fine mist and apply the spray so that the drops do not run together. Pure kerosene has great penetrating powdr, perhaps the greatest of all the insecticides.

Kerosene emulsion is not as cheap as resin soap, but is easier to make. It kills only by contact. Use 2 parts of kerosene to 1 part of sour milk, or of strong soap solution. The latter must be made boiling hot and aided to the kerosene, and the whole pumped thru a spray nozzle 15 minutes. When the emulsion is perfect there will be no separation when [illegible].

1932

1908 - Worsham, E.L. and Chase, W.W.

Reports on Experiments for the Control of San Jose Scale, 1907 - 1908.

Ga. Sta. Bd. Ent.Circ. 8, 8 pp.

The soluble oils tested in these experiments were as follows: Scalecide, Target Brand Scale Destroyer, Kil-O-scale, Soluble Petroleum, Schnarr's compound No. 1 and Schnarr's Compound No 2. Each material was tested at three different strengths, and each had a trial as a fall treatment, as a spring treatment, and as a double treatment. The results of these sprayings show that the fall sprayings were, in every case, of superior effectiveness to those applied in the spring. With several of the materials, the spring treatments were almost worthless in controlling the scale. The double sprayings were slightly more effective than the fall sprayings. Target Brand Scale Destroyer: Excellent results were obtained from the fall application. The 1-20 dilution being better than the 1-10 and the 1-15. At 1-20 the spring application gave poor results; at 1-15 the results were very good; at 1-10 the treatment was very effective. Double treatment at 1-15 and 1-10 destroyed practically all the scale. Kil-O-scale: Fall treatment 1-20, 1-15 and 1-10 were equally unsuccessful in controlling the scale. At 1-15 and 1-10 the double treatments were highly efficient. Spring sprayings at 1-20 and 1-15 were valueless; at 1-10 the spring treatment gave only fair results and must be called unsatisfactory. Soluble Petroleum: Fall sprayings at all proportions except 1-20 were very effective; at 1-20 fall sprayings were only partially successful; double treatment at all proportions nearly perfect. The spring sprayings with soluble petroleum were more effective than those with any of the other oils. Scalecide: Used 1-12 1-12 and 1-10; at 1-12 and 1-10 the fall sprayings were very effective. The double treatment at all strengths was highly effective. Only the 1-10 strength as a spring spray was effective. As a fall treatment, Scalecide is of more value than as a spring treatment. Schnarr's Compounds: No. I; At 1-20 the fall application was worthless. The fall application at 1-15 killed nearly all the scale, and the 1-10 was nearly perfect in its results. All the double treatments were highly efficient. At all dilutions the spring treatment was an absolute failure. No. II: This did not arrive in time for use as a fall spray. It failed to mix well with water, and results from the partial mixing were worthless.

1911. Yothers, W. W.

1936 Proc. 24 Ann Meeting Florida State Hort.Soc.1911, p.53-64.

Four formulas are given:

Formula I.

Caustic potash whale oil soap	1-1/2	gals.
Crude oil, 24° Be.	3	gals.
Water to emulsify about	2	gals.

This will make 200 gals. of spray material containing 1-1/2% oil.

Formula II.

Caustic Potash Whale oil soap	2	gals.
Distillate oil (gas oil)30°Be.	4	gals.
Water to emulsify about	2	gals.

This will make 200 gals of 2% oil spray.

Formula III.

Caustic potash whale oil soap	2	gals.
Paraffin oil (Diamond Paraffin 28°Be)	3	gals.
Water	1	gal.

This will make 200 gals. of 1-1/2% oil spray.

Formula IV.

Caustic potash whale oil soap	2	gals.
Paraffin oil (Jr.Red Engine)25° Be.	3	gals.
Water	1	gal.

This will make 200 gals. of 1-1/2% oil spray.

The only precaution to be taken in preparation is that the oil should be added to the soap gradually while this is being stirred. It does not work as well to add the soap to the oil or to add the oil to the soap too suddenly.

Experiments were made with these emulsions. No injury to trees occurred even where 2% oil was used. All gave better than 98% kill of white fly. These same emulsions were tried on the white fly in young stages with the same success. Kerosene emulsion made by the R & H formula only gave 71% kill.

The paraffin emulsions had an immediate effect upon the loosening of the sooty mold. The petroleum fuel oil and distillate oil emulsion did not.

1913. Yothers, W.W.

1937 The effcts of oil insecticides on Citrus trees and fruits,

Jour. Econ, Ent. 6, ~~1913~~, No. 2, pp. 161-164.

Commercial and home made insecticides having a mineral oil base are generally safe to use on Citrus trees or fruit. The use of H_2SO_4 in a spray should be avoided. A commercial miscible oil which contained 2.5 o/o H_2SO_4 was very injurious to foliage at 0.5 o/o oil concentration. This acid apparently does not increase the insecticidal properties of the spray. Rosin or Rosin oil should also be avoided. When commercial or home-made miscible oils, contain rosin they burn fruit and foliage at 1 o/o oil concentration. It did not increase the insecticidal qualities as much as expected. Emulsions of petroleum fuel oil 2? Be, distillate or gas oil 28° Be and 2 paraffine oils of 24° Be resp., were used extensively and did no immediate damage to fruit or foliage. A slight effect was noticed on a new growth several weeks after applying petroleum fuel oil 1 o/o, distillate oil 1.5 o/o, paraffin oil 28° Be 1 o/o and paraffin oil 24° Be. 1 o/o. The foliage remained light green instead of changing to dark green. In one month this condition had entirely disappeared. Differences were observed between the different oils. Yothers believes that the coating of the leaves with the oil interfered to a limited extent with the formation of chlorophyll. The accumulative effect of oils was shown as follows: Trees were sprayed three times at 6 week intervals with Paraffin oil 24° Be using 1.5 o/o oil. The leaves of these trees were dwarfed, there were a considerable number of dead twigs and the fruit was very small, late and sour. Yothers is of the opinion that a 0.5 o/o oil spray would not have an accumulative effect even if applied frequently. Since Hubbard's early investigations it is known that the application of kerosene at times of low temperature is attended by plant injury, due to prevention of evaporation of the kerosene and its long contact with the foliage. Oils used in the manufacture of miscible oils and petroleum fuel oil, distillate oil, and paraffin oils are much less volatile than kerosene, yet injury seldom follows their application at times of low temperature. Spraying should cease, however, just before a freeze. Neither hot sun, shade, rain or dry weather is influential in causing damage during or following the application of these oils. Their effect on bloom is not known. Oils, including kerosene, cause dim shadows or faint green blotches on the fruit early in the season which disappears later.

In the discussion following this article Mr. H.J. Quayle stated that distillate oils at 1 to 3 o/o oil concentration are used on dormant trees, also heavy crude oils(California Crude) of 16°- 18°Be in soap emulsion as high as 15 o/o concentration. The latter is the only thing that will control the Italian Pear scale successfully. No complaint of injury has come from the use of these oils. Mr. H.A. Gossard stated that trees treated with commercial oil sprays in the Fall had some fruit buds killed which the manufacturers thought due to S in the H_2O used in diluting the mixtures. He believes lime-sulfur safer to recommend than oils or commercial mixtures. Mr. T.B. Symons said that lime-sulfur would not control peach lecanium but oil mixtures would.

[illegible] Yothers, W.W.

1946 Cold process oil emulsions. Jr. Ec Ent. vol 18, no.3, pp. 545-546.

Kaolin emulsion: Lubricating oil, 2 gal., water 1 gal.; Kaolin, 2-2/3 lbs Add the kaolin to the water, then add the oil and pump twice. This emulsion will mix with any [illegible].

[illegible]: This is perhaps superior to the soap-glue emulsion. [illegible] glue 1 lb. Dissolve the glue with or without heat, add the oil and pump three times. 12 oz. glue is not enough; 24 oz is too much. This emulsion will mix with lime-sulfur solution and hard water. It will probably ferment in a few days.

Skimmed milk powder emulsion:

Lubricating oil 2 gals; water 1 gal., skimmed milk powder 14 to 16 oz. Add the milk powder slowly to the water with vigorous beating then add oil and pump ~~twice~~ three times. This will mix with lime-sulfur solution and probably with most hard water. It is more easily made than with Ca-caseinate. It will probably soon ferment.